Communications Division
National Museum of Man

National Museums
of Canada

National Museum
of Man

Ottawa 1972

Publications in
Archaeology, No. 2

Copper Eskimo Prehistory

Robert McGhee

Publications
d'Archéologie, nº 2

Musées nationaux
du Canada

Musée national
de l'Homme

Copper Eskimo Prehistory

National Museum of Man
Publications in Archaeology, No. 2

Published by the
National Museums of Canada

Board of Trustees

Mr. Jean P. W. Ostiguy, Chairman
Mr. J. R. Longstaffe, Vice-Chairman
Mr. Jean Boucher
Mr. Allan Bronfman
Mrs. Nina Cohen
Mrs. Phyllis George
Mr. George W. P. Heffelfinger
Prof. Kiyoshi Izumi
Dr. Amiot Jolicoeur
Mrs. Cécile Marcoux-Baillargeon
Dr. W. G. Schneider
Mr. David Spurgeon
Prof. G. Stephen Vickers
Dr. J. Tuzo Wilson

Mr. C. J. Mackenzie
Secretary General
National Museums of Canada

Dr. William E. Taylor, Jr., Director
National Museum of Man

Staff editor
Melodie Corrigall

Publication supported by
The Margaret Hess
Canadian Studies Fund
of the National Museum of Man

Musée national de l'Homme
Publications d'Archéologie, nº 2

Publié par les
Musées nationaux du Canada

Conseil d'administration

M. Jean P. W. Ostiguy, Président
M. J. R. Longstaffe, Vice-Président
M. Jean Boucher
M. Allan Bronfman
Mme Nina Cohen
Mme Phyllis George
M. George W. P. Heffelfinger
Prof. Kiyoshi Izumi
Dr Amiot Jolicoeur
Mme Cécile Marcoux-Baillargeon
M. W. G. Schneider
M. David Spurgeon
Prof. G. Stephen Vickers
M. J. Tuzo Wilson

M. C. J. Mackenzie
Secrétaire Général
Musées nationaux du Canada

M. William E. Taylor, fils, Directeur
Musée national de l'Homme

Ouvrage subventionné par
Le Fonds Margaret Hess
d'Études canadiennes
du Musée national de l'Homme

Copper Eskimo Prehistory

105-01976/

Robert McGhee

©Crown Copyrights reserved

Available by mail
from the
National Museums of Canada
Marketing Services
Ottawa K1A OM8

Catalogue No. NM95-13/2

National Museum of Man
National Museums of Canada
Ottawa, Canada
1972

PO987654321
Y798765432
Litho in Canada

Contents

List of Plates, vii

List of Figures, vii

List of Tables, viii

Résumé, ix

Summary, x

Biographical Note, xi

Acknowledgments, xi

Chapter I: Introduction, 1

Chapter II: Distribution Studies, 6
Blood Group Systems, 6
Cranial Measurements, 9
Lexical Traits, 13
Material Culture, 17
Inferences, 20

Chapter III: Archaeological Studies, 21
The Thule Period, 21
The Memorana Site, 21
Structures, 24
Artifacts, 24
  A. Sea Hunting Equipment, 24
  B. Land Hunting Equipment, 28
  C. Fishing Equipment, 30
  D. Transportation Equipment, 31
  E. Men's Tools, 31
  F. Women's Tools and Household Equipment, 33
  G. Miscellaneous, 36
The Bloody Falls Site, 39
Structures, 40
Artifacts, 43
  A. Sea Hunting Equipment, 43
  B. Land Hunting Equipment, 43
  C. Fishing Equipment, 44
  D. Transportation Equipment, 47
  E. Men's Tools, 47
  F. Women's Tools and Household Equipment, 48
  G. Miscellaneous, 51
The Thule Period in the Copper Eskimo Area, 52
Definition, 52
Known Sites, 53
Culture of the Thule Period Population, 54

Contents

The Intermediate Interval, 57
The Nichol Site, 58
Structures, 58
Artifacts, 61
  A. Sea Hunting Equipment, 61
  B. Land Hunting Equipment, 61
  C. Fishing Equipment, 62
  D. Transportation Equipment, 62
  E. Men's Tools, 62
  F. Women's Tools, 64
The Bullard Site, 64
The Tardy Site, 65
The Intermediate Interval in the Copper Eskimo Area, 67
Definition, 67
Known Sites, 67
Culture of the Intermediate Interval Population, 68

The Historic Period, 70
The Kunana Site, 71
Structures, 71
Artifacts, 76
  A. Sea Hunting Equipment, 76
  B. Land Hunting Equipment, 83
  C. Fishing Equipment, 85
  D. Transportation Equipment, 89
  E. Men's Tools, 89
  F. Women's Tools and Household Equipment, 92
  G. Miscellaneous, 96
The Historic Period in the Copper Eskimo Area, 100
Definition, 100
Known Sites, 100
Culture of the Historic Period Population, 100

Chapter IV: Continuity and Change, 102
Structures, 102
Artifacts, 104
Subsistence and Social Organization, 116

Chapter V: Causes of Culture Change, 119
Geological Factors, 119
Climatic Factors, 119
European Influence, 125

Conclusions, 130

Appendix, 131

Bibliography, 138

List of Plates

I. Memorana Site: Sea Hunting Equipment, 26
II. Memorana Site: Land Hunting and Fishing Equipment, 29
III. Memorana Site: Men's Tools, 32
IV. Memorana Site: Women's Tools, 35
V. Memorana Site: Miscellaneous Artifacts, 38
VI. Bloody Falls Site: Hunting and Fishing Equipment, 45
VII. Bloody Falls Site: Men's Tools, 46
VIII. Bloody Falls Site: Women's Tools and Miscellaneous Artifacts, 49
IX. Nichol Site: Miscellaneous Artifacts, 63
X. Other Intermediate Interval Sites: Miscellaneous Artifacts, 69
XI. Kunana Site: Harpoon Heads, 75
XII. Kunana Site: Harpoon Heads, 77
XIII. Kunana Site: Harpoon Heads, 78
XIV. Kunana Site: Sea Hunting Equipment, 81
XV. Kunana Site: Land Hunting Equipment, 82
XVI. Kunana Site: Fishing Equipment, 87
XVII. Kunana Site: Men's Tools, 90
XVIII. Kunana Site: Women's Tools, 95
XIX. Kunana Site: Miscellaneous Artifacts, 98

List of Figures

1. Locations of Historic Eskimo Populations Discussed, 2
2. Locations of Thule Period Sites, 21
3. Map of Memorana Site, 22
4. Memorana Site, Plan of House 1, 25
5. Map of Bloody Falls Site, 41
6. Bloody Falls Site, Plan of Structure 3, 42
7. Locations of Intermediate Interval Sites, 56
8. Map of Kuujjua River Sites, 59
9. Nichol Site, Plan of Structure 1, 60
10. Tardy Site, Plan of Structures 42 and 43, 66
11. Locations of Historic Period Occupations, 70
12. Map of Kunana Site, 72
13. Kunana Site, Plan of Structure 6, 73

List of Tables

1. Blood Group Gene Frequency Distributions, 7
2. Gene Frequencies for Grouped Populations, 9
3. Means for Cranial Measurements, 11
4. Penrose Total Distance Coefficients, 12
5. Penrose Size and Shape Distance Coefficients, 13
6. Correlation Coefficients on Cognate Counts, 15
7. Saturation and Specificity Values on Cognate Counts, 16
8. Saturation Products for Cognate Counts, 17
9. Correlation Coefficients on Material Culture Elements, 18
10. Saturation and Specificity Values on Material Culture Elements, 19
11. Saturation Products for Material Culture Elements, 19

Résumé

Les Esquimaux du cuivre* sont une tribu d'environ 800 personnes aborigènes du Golfe du Couronnement et de la région de l'Ile Victoria dans l'Arctique central. Jenness étudia ces gens entre 1914 et 1916. Il émit l'opinion que leurs ancêtres s'étaient récemment établis en cet endroit venant des plaines désertiques de l'intérieur, à l'ouest de la Baie d'Hudson. Cette hypothèse est celle de plusieurs autres chercheurs. Ceux-ci considèrent que le groupe d'Esquimaux de l'Arctique central s'est développé à l'intérieur du nord canadien et s'associe biologiquement et culturellement aux Amérindiens. Des fouilles récentes suggèrent que ces indigènes descendraient plutôt des Esquimaux de culture Thulé, qui se déplacèrent de l'Alaska vers l'Arctique, vers l'an mille de notre ère. Par l'intermédiaire des Esquimaux d'Alaska, ils descendraient donc originairement des populations du nord-est asiatique plutôt que des Amérindiens. Le présent ouvrage étudie cette alternative en tant qu'elle s'applique à la préhistoire des Esquimaux du cuivre.

Les observations reliant les Esquimaux du Centre aux Indiens se fondaient surtout sur des études biologiques, linguistiques et culturelles. Une nouvelle analyse reposant sur des techniques quantitatives simples indique que toutes les peuplades de l'Arctique central descendraient de la culture Thulé. Le présent ouvrage rapporte brièvement les résultats de fouilles archéologiques fraîches se rattachant à différents sites de cette culture ainsi que de la préhistoire moyenne et récente des Esquimaux du cuivre. On est porté à conclure que la culture de ces derniers se développa à partir d'une sous-culture Thulé qui s'adapta aux conditions particulières du milieu. Cette adaptation ancienne supposait un approvisionnement local en bois, en stéatite et en cuivre et se fondait sur l'économie du phoque, du caribou et du poisson plutôt que sur la chasse aux mammifères marins.

On explique l'évolution culturelle des Esquimaux du cuivre depuis le Thulé à l'aide d'un modèle: il s'agit de la transformation du milieu du Golfe du Couronnement au cours du dernier millénaire. On suppose que la dégradation climatique des dix-septième et dix-huitième siècles força les descendants des peuplades Thulé à modifier leurs techniques. Ils mirent au point des méthodes de chasse adaptées à la banquise et qui caractérisent les Esquimaux du Centre pendant la période historique. Plusieurs des traits culturels des Esquimaux du cuivre se développèrent durant le dix-neuvième siècle. C'est ainsi qu'ils améliorèrent leurs procédés et produisirent de nouveaux biens à échanger contre des marchandises européennes; celles-ci, avec les nouvelles maladies infectieuses, se répandirent dans l'Arctique central pendant tout le siècle qui précéda le contact continu avec les Européens.

---

*On désigne ainsi les Esquimaux forgeurs de cuivre.

Summary

The "Copper Eskimo" is the name given to a tribe of approximately 800 Eskimos who aboriginally inhabited the Coronation Gulf and Victoria Island region of the central Canadian Arctic. Jenness, who studied this group between 1914 and 1916, postulated that the ancestors of the Copper Eskimo had recently moved to this area from the interior Barren Grounds west of Hudson Bay. This hypothesis coincides with that of several other scholars, who considered the Central Eskimo groups to have developed in the interior of northern Canada and to have been biologically and culturally related to American Indians. Recent archaeological work has suggested that the Central Eskimo are descended from Thule culture Eskimos who moved into the Canadian Arctic from Alaska about A.D. 1000, and are therefore descended from Alaskan Eskimos and ultimately from northeastern Asiatic populations rather than from American Indians. The present work examines these alternate hypotheses, specifically as they apply to the prehistory of the Copper Eskimos.

The evidence relating the Central Eskimos to American Indians was based largely on studies of the distribution of biological, linguistic and cultural traits among these populations. A reanalysis of this evidence, using simple quantitative techniques, suggests that the distributional evidence is consistent with the descent of all Central Eskimo groups from a common Thule culture ancestry. Several Thule, intermediate, and late prehistoric Copper Eskimo sites recently excavated are briefly reported in this work. The evidence gathered in these excavations suggests that Copper Eskimo culture developed from a variant of Thule culture which had adapted to local environmental conditions. This early adaptation involved the use of local supplies of wood, soapstone and copper, and an economy based on seals, caribou and fish rather than on open water hunting of large sea mammals.

A model of environmental change over the past 1000 years in the Coronation Gulf area is postulated as a basis for explaining the development of Copper Eskimo culture from a Thule ancestry. It is argued that the deteriorating climate of the seventeenth and eighteenth centuries induced the descendants of the Thule people to change their technology and to develop the ice-hunting culture characteristic of the historic Central Eskimos. Many of the distinctive features of Copper Eskimo culture developed during the nineteenth century. They reflected changes in technology and trade patterns resulting from the introduction of European trade goods and diseases which penetrated the central Arctic during the century prior to direct contact with Europeans.

Biographical Note

Robert McGhee graduated from the University of Calgary in 1968 with a Ph.D. in Archaeology. His primary archaeological interest is in tracing the development of Eskimo cultures. Since 1966 he has done field work in the central Canadian Arctic, working on the prehistory of the Copper Eskimo (1966-68) and Mackenzie Eskimo (1969-70) groups. Since 1968 he has been Arctic Archaeologist at the National Museum of Man.

Acknowledgments

The archaeological field work upon which this report is based was carried out under the auspices of the National Museum of Man. The original version of the report was prepared while the writer was a graduate student at the University of Calgary, and was presented as a doctoral dissertation to the Archaeology Department of that University.

The writer wishes to express his gratitude to those residents of the communities of Holman and Coppermine, N.W.T. who assisted his work during the summers of 1966 and 1968. The Archaeology Department of the University of Calgary provided an ideally helpful and critical environment in which the original manuscript evolved. Several colleagues at the National Museum of Man read the manuscript and contributed extremely useful discussion. The writer is especially grateful to the late Dr. Diamond Jenness whose incisive comments cut away some of the more ragged thoughts included in the original version of the report.

March 18, 1969.

The figures were drawn by D. W. Laverie.

Chapter I Introduction

The Copper Eskimo, the most westerly of the Central Eskimo populations, inhabit southern Victoria Island and the adjacent mainland area in the central Canadian Arctic (Fig. 1). Although contacted briefly by several British expeditions during the late eighteenth and nineteenth centuries, the Copper Eskimo remained in virtual isolation from direct European influence until the early twentieth century, when they were described ethnographically by Stefansson, Jenness, and Rasmussen. The population of this tribe in early historic times seems to have been about 800 people, living in scattered nomadic groups engaged in fishing and caribou hunting during the summer months, and congregating in a few large bands for winter sealing from the sea ice. Most of the Copper Eskimo now live in the communities of Coppermine, Holman, Cambridge Bay, and Bathurst Inlet and have achieved a relatively successful adaptation to the culture and economy of the modern Canadian north. The present work attempts to delineate the prehistory of these people.

Theories concerning the origin and development of Eskimo culture have been sporadically expounded, elaborated, revised, and rejected over the past 200 years. The profusion and variety of schemes presented during this period have been primarily the result of the gradual and prolonged accumulation of knowledge available to culture historians. Most of these schemes were relatively sound within the context of contemporaneous evidence and of the questions suggested by that evidence. The exploration of a few more miles of Arctic coast, contact with a previously unknown group of Eskimos, or the application of a new historical technique, however, have all repeatedly cast doubt on older interpretations and suggested new questions. The historians of Eskimo culture have traditionally answered these questions to the best of their ability, despite the paucity of evidence available.

The first prolonged contact between Eskimos and Europeans took place in Greenland, Labrador, and the Canadian Arctic surrounding Hudson Bay. To eighteenth-century writers such as David Crantz (1820, Vol. I: 239-41), Moravian missionary to Greenland, and Samuel Hearne (1958: 108-110), English trader and explorer in Hudson Bay, Eskimo race and culture were essentially uniform throughout their known range but differed markedly from those of the other inhabitants of North America. This dissimilarity, combined with real and fancied resemblances between the Eskimo and the inhabitants of "Great Tartary between Mongolia and the Arctic Ocean," led Crantz (1820, Vol. I: 239), the first scholar to deal with Eskimo prehistory, to postulate an Asiatic origin for the Eskimo race.

Largely as a result of newly acquired information concerning Eskimo groups of the central Arctic, the focus of the problem shifted during the nineteenth century. It gradually became obvious that Eskimo culture was not uniform throughout its range: the basic economic and material adaptations of the newly discovered Central Eskimo differed from those of Alaskan and Eastern Eskimo to a greater extent than the two latter groups differed from one another. When the comparative distribution studies of historical ethnology and anthropogeography were applied to this new evidence, two sets of postulates were formulated.

The first set, represented primarily

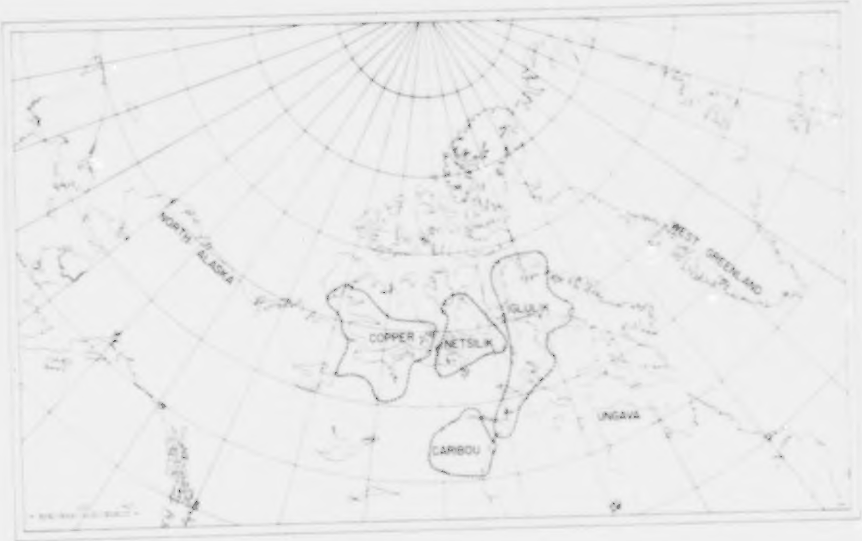


Fig. 1 Locations of historic Eskimo populations discussed

by the studies of Murdoch (1888), Boas (1910), Steensby (1917), and Birket-Smith (1929), placed the original centre of Eskimo culture in the central Canadian Subarctic between the Mackenzie River and Hudson Bay. In this area there supposedly dwelt inland tribes of "Proto-Eskimo," related biologically and culturally to northern American Indians. At some time in the distant past, some of these groups expanded northward to the central Arctic coast and developed a culture that was adapted to tundra and littoral ice hunting. This "Palaeo-Eskimo" culture then spread along the Arctic coast, becoming more complex and more specialized in open-water hunting of the large sea mammals found in the eastern and western Arctic. In Alaska, the expanding Eskimo culture formed a wedge between the Alaskan Indians and the natives of northeastern Siberia.

The second set of postulates, including those of Rink (1891), Hatt (1916), Jenness (1923, 1937), Mathiassen (1927*b*, 1930) and Birket-Smith (1930, 1945, 1959), assumed that much Eskimo cultural development took place in the western Arctic. Although recognizing the existence in the central Arctic of a culture derived from Asia or Alaska, they considered the distinctiveness of the historic Central Eskimo to be primarily the result of a recent advance to the coast by inland groups, which supplanted or amalgamated with the older coastal culture. At its height of elaboration, this theory involved inland "Eschato-Eskimo" who were considered to be the descendants of Proto-Eskimo groups, which had remained in the interior after the original Palaeo-Eskimo advance to the coast, and which stressed inland tundra hunting and fishing rather than adaptation to a littoral economy.

Although these theories were based primarily on the distributions of cultural and linguistic traits among northern populations, they were supported by evidence from physical anthropology, especially the comparisons of cranial measurements, which suggested a northern Indian element in the Eskimo populations of the central Arctic (Shapiro 1931, Seltzer 1933). The particular distinctiveness of the Copper Eskimo led to further speculation, involving postulated biological and cultural ancestry ranging from Greenlandic Norse (Stefansson 1913) to Archaic Indians of the Great Lakes area (Quimby 1962).

The most recent phase of speculation concerning the history of Eskimo culture is based primarily on the archaeological investigations that began in the early twentieth century and have accelerated to the present time. The archaeological evidence, as it is now interpreted by most workers, places the original development of Eskimo culture in the Bering Strait or North Pacific area, from whence it was carried into the central and eastern Arctic by the bearers of the archaeologically known Thule culture (Mathiassen 1927*b*; Collins 1937; Ford 1959; Taylor 1963). Central Eskimo culture can no longer be considered the survival of a primaeval stage of Eskimo culture in general; on the other hand, the paucity of archaeological investigation in the central Arctic has so far precluded an adequate discussion of the postulated non-Thule or Eschato Eskimo ancestry of the central populations.

Preliminary archaeological findings in the central Arctic led Mathiassen (1928), Harp (1961), and VanStone (1962) to suggest that historic Iglulik, Netsilik and Caribou Eskimo cultures developed from localized variants of Thule culture (Fig. 1). Recent work in the Coronation Gulf area has revealed a Thule culture variant that subsisted heavily on caribou, fish, and seals, as did the historic Copper Eskimo, and that yielded very little evidence of the whaling industry so characteristic of Thule culture as it is known elsewhere in the Arctic (Taylor 1964, 1965, 1966, n.d.). This discovery led Taylor to reconsider the hypothesis of Noice (1922) that the historic Copper Eskimo are the product of an indigenous development in the Coronation Gulf area, from what is now recognized as a central Arctic variant of Thule culture; this implies a rejection of the hypothesis of Jenness (1923) that the ancestors of the Copper Eskimo migrated to Coronation Gulf from the interior west of Hudson Bay shortly prior to European contact. The present work endeavours to examine these alternate hypotheses in the light of the amended distributional studies and the recently obtained archaeological evidence that will be presented in the chapters that follow.

As a background to the main body of evidence and interpretation, it is appropriate at this time to present the archaeologically documented framework within which interpretations will be made. This framework may be briefly described in terms of the development of two cultural traditions.

(1) The earliest widespread occupants of the North American Arctic between Bering Strait and Greenland were the bearers of the Arctic Small Tool tradition, which originated in the Bering Strait area and moved eastward at some time before 2000 B.C. (MacNeish 1959; Irving 1962; Giddings 1964). The descendants of

the Arctic Small Tool tradition people in the central and eastern Arctic are recognized archaeologically as the Dorset culture, which occupied the area until approximately A.D. 1000 or slightly later (Collins 1956; Harp 1964; Taylor 1959, 1968). The Dorset people probably spoke an Eskimoan language (Hammerich 1958; Dumond 1965) and were probably Eskimo in physical type (Laughlin and Taylor 1960; Oschinsky 1964; Harp and Hughes 1968). Dorset culture existed at least as far west as Dolphin and Union Strait (Taylor 1965) but seems to have developed in effective isolation from the Thule tradition, which was developing contemporaneously along the Alaskan coast and perhaps as far east as Amundsen Gulf (Taylor 1963). The adequately known Dorset material culture is quite distinct from that of later inhabitants of the area. Nevertheless, a few elements of Dorset material culture and subsistence techniques (primarily the absence of a large sea mammal hunting complex) have led Larsen and Rainey (1948) and Birket-Smith (1959) to propose a Dorset or Dorset-like ancestry for the hypothetical Eschato-Eskimo.

(2) The Thule tradition, represented by the bearers of early Thule culture, began to spread eastward across the Canadian Arctic at some time close to A.D. 1000 (Mathiassen 1927*b*; Holtved 1944; Ford 1959; Taylor 1963). The archaeological evidence relating to contact between Dorset and Thule populations is very scarce (Taylor 1959, 1963); it must be assumed that the time range, nature, and intensity of contact varied greatly in different areas of the contact zone. The earliest eastward movement of Thule culture may have been through the High Arctic islands north of Parry Channel (Collins 1964), from which the descendants of the Thule people had retreated at some time prior to European exploration of the area in the nineteenth century. Thule culture movements and developments in more southerly areas of the Canadian Arctic are, unfortunately, very poorly known. Several archaeologists have noted the appearance of Canadian Thule culture items in the late prehistoric portions of North Alaskan archaeological sequences (Collins 1937; Larsen and Rainey 1948; Giddings 1952; Ford 1959). This is usually interpreted as representing a return migration or "backwash" of Thule people from the central Arctic to North Alaska in the centuries immediately preceding European contact.

Chapter II presents a comparison of the historic Copper Eskimo with several other historic populations that occupied the area between Bering Strait and Greenland. On the basis of the distribution of various biological and cultural attributes, I attempt to assess the inter-relationships of these groups in terms of the historical framework outlined above. Specifically, the distributional patterns are used as a basis for judging the relative importance of common Thule ancestry, various axes of contact between groups, and the postulated existence of a Palaeo-Eskimo, Indian, or Dorset element in the race and culture of the Central Eskimo populations.

Chapter III comprises a brief description of several archaeological sites I have excavated in the Copper Eskimo area, and the construction of a tentative cultural sequence from the scanty archaeological evidence available. In Chapter IV, historic Copper

Eskimo culture is compared with Thule culture as it is known from the area, and with archaeological manifestations that appear to be chronologically intermediate between the Thule and Historic periods. This is followed by a chapter dealing with the factors that may have caused the decline of Thule culture in this area, and promoted the subsequent development of Copper Eskimo culture. Finally, the results of the study are presented as a series of speculative hypotheses, which may be tested by future research. In presenting these hypotheses, I can only plead to be following hallowed eskimological tradition in generating new speculation hard upon the heels of newly acquired evidence.

Chapter II Distribution Studies

The Eschato-Eskimo hypotheses were advanced at a time when the archaeology of the central Arctic was practically unknown. The evidence used as a basis for these hypotheses was primarily the distribution of biological and cultural characteristics among historic Eskimo groups, interpreted according to the postulates of various kinds of historical ethnology. The past few years have seen many additions to our knowledge of several Eskimo groups, but no extensive attempt has been made to test or revise the original distribution studies. This is primarily a result of declining confidence in the validity of "historical" methods in ethnology, methods that I consider to be still useful in the investigation of limited historical problems. These methods cannot be used, as they often have been, to provide proof of the occurrence of historical events. They are useful, however, in generating hypotheses that may be tested archaeologically, and in weighing alternate hypotheses in terms of their coherence with the distributional evidence. As such, "historical" methods cannot be ignored by the prehistorian.

The following section briefly reworks the old distribution studies by introducing some additional evidence, by using various quantitative techniques that facilitate the simultaneous comparison of several populations, and by introducing confidence tests that aid in assessing the significance of comparative statements. Interpretations of distributional patterns are made in terms of the historical model outlined in Chapter I.

Blood Group Systems

Several problems are encountered in tracing Eskimo historical relationships through the distribution of blood group types. Chown and Lewis (1962: 187-88) have noted that there is no certain knowledge about the strength or direction of selection in the Eskimo population for any blood group gene. Moreover, the relatively small and isolated Eskimo subpopulations provide an ideal situation for the development of random genetic drift, a process that may easily confuse historical interpretations. Other problems arise from the inadequate size of most samples, the lack of standardized techniques and reporting and, in many studies, the possible inclusion of Eskimo-European hybrids. Fortunately, Chown and Lewis (1956, 1959, 1962) and Corcoran et al. (1959) have presented comparable gene frequencies in six blood group systems for seven relatively pure Eskimo populations occupying areas ranging from Ungava and Baffin Island to North Alaska. A rapid inspection of Table 1 suggests that even in these data the factors of confusion have been hard at work; most gene frequencies appear to be randomly distributed among all seven populations.

Chown and Lewis (1959: 16-17) suggested that certain differences in the gene frequencies of Canadian Eskimo groups listed in Table 1 may be the result of a recognizable Dorset genetic residue in some Central Eskimo populations. In this connection they note the apparent clinal distribution of *MNS* gene frequencies from the Ungava Eskimo in the east to the Copper Eskimo in the west, as well as the fact that the Copper Eskimo exhibit the highest frequency

Table 1

Blood Group Gene Frequency Distributions

Gene	Anaktuvuk[a] (N=55)	Wainwright[a] (N=111)	Barrow[a] (N=64)	Copper[b] (N=320)	Aivilik[c] (N=43)	Okomiut[c] (N=87)	Ungava[d] (N=64)
0	.44	.55	.54	.68	.64	.63	.63
A_1	.39	.35	.41	.29	.36	.37	.35
A_2	.00	.01	.02	.00	.00	.00	.00
B	.17	.09	.03	.03	.00	.00	.01
M	.89	.82	.80	.84	.79	.75	.65
N	.11	.18	.20	.16	.21	.25	.35
S	.03	.16	.16	.18	.02	.05	.05
s	.97	.84	.84	.82	.98	.95	.95
P_1	.36	.17	.38	.18	.25	.36	.29
P_2	.64	.83	.62	.82	.75	.64	.71
$R^1 + r'$	.45	.48	.41	.50	.81	.63	.48
$R^2 + r''$	.55	.51	.54	.49	.14	.37	.50
$R^0 + r$	.00	.01	.05	.01	.05	.00	.01
Fy^a	1.00	.79	1.00	.75	.89	.87	1.00
Fy^b	.00	.21	.00	.25	.11	.13	.00

[a] Corcoran et al., 1959
[b] Chown and Lewis 1959
[c] Chown and Lewis 1962, recalculated for "pure" samples
[d] Chown and Lewis 1956

of *MS* and Fy^b of all groups tested. A closer examination of the data suggests that the significance of this pattern may be more illusory than real.

First, the clinal appearance of the *MNS* distribution largely disappears when gene frequencies of pure Aivilik and Okomiut are calculated and substituted for the mixed pure and hybrid sample frequencies presented by Chown and Lewis. The resulting array displays a slight clinal distribution of the *MN* genes and an abrupt shift from low frequency of *S* in the east (and at Anaktuvuk Pass) to higher *S* frequencies among the Copper and coastal Alaskan Eskimo groups. Secondly, the fact that the Copper Eskimo exhibit the highest frequency for two genes (*S* and Fy^b) diminishes in importance when one notes that most of the other samples have one or more gene frequencies that are outside the range of the other populations. We are probably safe in concluding that the analysis of frequency distributions of single genes is of little value to historical reconstruction in the present case, because of the combined effects of inadequate sample size, unknown selective factors, and the probability of random genetic drift.

An attempt may be made to salvage some information by combining populations in order to obtain more adequate samples, and by comparing differences between pairs of populations on all six blood group systems simultaneously. The latter technique turns to advantage the diversifying effects of selection and random genetic drift by measuring the inferred genetic distance created by these processes acting over time. For this purpose, the three North Alaskan populations (Anaktuvuk, Wainwright, and Point Barrow) are combined; this combination is felt to be justified by the large amount of population movement that occurred among these communities during the nineteenth century (Spencer 1959: 14-22), and by the fact that, on the frequencies of the eight non-complementary genes compared, the three samples are not significantly distinct at the .20 level (X^2 = 17.05 for df = 14). The three eastern populations (Aivilik, a branch of the Iglulik group; Okomiut, of central Baffin Island; and Ungava Eskimo) are also combined, the justification being that the three samples are not significantly different at the .30 level (X^2 = 15.96 for df = 14). This similarity in gene frequencies may reflect the interbreeding or movement between these groups, which was reported by Boas (1888: 432, 462-63) during the late nineteenth century. Table 2 lists the frequencies of eight non-complementary genes for the three populations resulting from this grouping procedure. All three of these samples are significantly distinct at the .01 level (for df = 7, Alaska-Copper X^2 = 18.90, Alaska-Eastern X^2 = 20.56, Copper-Eastern X^2 = 38.73). Gene frequencies for a sample of Athabaskan Indians from northern Alaska (Corcoran et al. 1959) are included for comparison.

Inferred genetic distance between populations may be calculated in terms of "mean taxonomic distance" (Sokal and Sneath 1963: 147) between pairs of samples. All eight sets of gene frequencies are first standardized by dividing divergence from the mean frequency by the standard deviation of divergence for each gene. Mean taxonomic distance is then calculated according to the following formula:

$$d_{jk}=\left(\frac{\Sigma (x_{ij}-x_{ik})^2}{n}\right)^{\frac{1}{2}}$$

where

x_i = standardized gene frequency for the i^{th} gene
j,k = samples to be compared
n = number of different genes.

At least three features of the array listed in Table 2 may be relevant to historical interpretation. First, the mean taxonomic distance between Alaska and Copper Eskimo standardized frequencies on all eight genes (0.96) is considerably smaller than that between Copper and Eastern Eskimos (1.44). This difference is significant at the .14 level when unstandardized frequencies are tested with a Mann-Whitney U test (U = 21 for n = 8) and reflects the fact that the Copper Eskimo frequencies are closer to the Alaskan end of the frequency range than to the Eastern end for all systems except *ABO*. Secondly, the mean taxonomic distance between Alaskan and Eastern Eskimos (1.09) is considerably smaller than that between Copper and Eastern Eskimos (1.44). This difference is significant at the .11 level (U = 19.5 for n = 8) and reflects the fact that the Copper Eskimo gene frequencies are outside the range of Alaskan and Eastern Eskimo frequencies for all except the *Rh* system. Finally, although the mean taxonomic distance between the Copper Eskimo and other Eskimo groups is smaller than that between the Copper Eskimo and the Athabaskan sample (1.50), the extreme values of the Copper Eskimo frequencies diverge from the Eskimo range in the direction of the Athabaskan frequencies for four out of the six blood group systems (*ABO, MN, S, P*). This pattern would seem to place the populations in the following schematic arrangement with regard

Table 2

Gene Frequencies for Grouped Populations

Gene	Eastern (N=194)	Alaskan (N=230)	Copper (N=320)	Athabaskan (N=188)
O	63	53	68	94
A_1	36	38	29	05
M	72	83	84	88
S	04	13	18	18
P_1	31	27	18	15
R^1,r'	62	45	50	30
R^2,r''	43	53	49	60
Fy^a	92	90	75	95

to inferred genetic distance: Athabaskan-Copper-Alaskan-Eastern.

The next step is to interpret this pattern in terms of our historical model. First, the fact that Copper Eskimo gene frequencies are closer to Alaskan than to Eastern Eskimo frequencies for five out of six blood group systems suggests that the pattern is not entirely the result of random divergence in isolated populations from a common Thule genetic heritage. Second, the distinctive frequencies of the Copper Eskimo can hardly be explained by the occurrence of a Dorset genetic residuum; such a residuum would be expected to result either in an equal divergence from both Alaskan and Eastern frequencies or, more likely, in a divergence toward the frequencies of the eastern Eskimo populations whose ancestors also participated in the Thule-Dorset contact situation. Third, if the observed distribution was influenced by contact between the three populations since initial Thule times, this contact and genetic interchange must have occurred along two primary axes: (1) Alaska-Copper Eskimo, perhaps occurring continuously along the Arctic coast throughout the past 1,000 years; (2) Alaska-Eastern Eskimo, which may have occurred to the north of the Copper Eskimo area, perhaps along Parry Channel. Finally, one must admit the possibility that genetic interchange occurred between northern Athabaskan Indians and Copper Eskimo; this possibility has been suggested by Jenness (1923*b*: 47) and cannot be discounted, despite the statement of Chown and Lewis (1959: 17) to the contrary.

Cranial Measurements

An analysis of the distribution of polygenetically controlled continuous morphological traits involves a somewhat different set of problems than those encountered in dealing with such monogenetic traits as blood types. The force and direction of selection acting on these traits are no better known than are those acting on blood group systems. Genetic distance cannot be estimated so accurately as is possible with blood group systems. On the other hand, the influence of random genetic drift is probably much weaker on polygenetic than on monogenetic traits. Laughlin and Jørgensen (1956: 3) point out that the methods of anthropometry and gene frequency analysis are complementary in assessing the relationships of Eskimo populations.

As in the blood group study, one is faced with the problems of inadequate sample size, inadequate reporting, and lack of standardized techniques. Nevertheless, comparable measurements are fortunately available on six continuous traits of cranial morphology (maximum cranial length, maximum biparietal breadth, total facial length, bizygomatic breadth, nasal length, and nasal breadth) for adequate samples of four male Eskimo populations. Jenness (1923*b*) made measurements on 82 male Copper Eskimo from the Coronation Gulf region; these may be combined without major duplication of individuals with measurements made by Stefansson (Seltzer 1933) on 30 male Victoria Island Copper Eskimo to give a total sample size of 112. Birket-Smith (1940) made comparable measurements on 107 male Hudson Bay Eskimos of the Netsilik, Iglulik, and Caribou tribes. Stefansson (Seltzer 1933) measured four comparable cranial and facial variables on small samples of four western Eskimo populations (Mackenzie, Point Barrow, inland North Alaska, Kotzebue Sound). Jenness (1923*b*) made nasal measurements on an extremely small sample of Mackenzie and North Alaskan Eskimos. The western Eskimo samples are combined into a single sample of 203 males, in the same way and for the same reason as they were combined in the blood group study, namely the large amount of population movement that took place throughout this area during the nineteenth century. The best comparable sample from the eastern Arctic is that of Gessain (1960), who measured 135 male Eskimo from southeast Greenland. I also compared a series of measurements on Chipewyan Indians (Grant 1930), in view of the similarities noted by Shapiro (1931: 378) and Seltzer (1933: 359) between Chipewyan and Copper Eskimo crania. The mean measurements on all five populations are listed in Table 3.

The significance of the apparent differences in mean measurements between these populations may be measured by an analysis of variance, using the harmonic mean method suggested by Walker and Lev (1953: 381-82) for dealing with unequal numbers of observations in the subcells. In the case of samples for which scores are not listed, the sum of squares within subcells is estimated by the formula

$$\Sigma x^2 = n(\sigma^2 + \bar{x}^2)$$

This formula assumes that (n) and not (n-1) was used in the original calculation of standard deviations.

The analysis of variance indicates that the Greenland and Hudson Bay samples are not significantly different at the .10 level (F = 0.218); the Alaska and Copper Eskimo samples are not significantly different at the .10 level (F = 1.210). The difference between Alaska or Copper Eskimo samples on the one hand and Greenland or Hudson Bay Eskimo samples on the other is, however, significant at the .01 level (smallest F = 8.847 between Alaska and Greenland). The Chipewyan sample is significantly different from all Eskimo populations, at least at the .05 level (smallest F = 4.426 for Chipewyan-Copper Eskimo). The degrees of significance of these differences should be kept in mind while dealing with the following manipulations of the data, since the signif-

Table 3

Means for Cranial Measurements

	Cranial Length	Cranial Breadth	Facial Length	Facial Breadth	Nasal Length	Nasal Breadth
Alaska[a] (203)	192.6	151.2	127.6	146.3	54.3	36.8
Copper[b] (112)	195.4	151.8	126.4	146.2	55.7	37.0
Hudson Bay[c] (107)	192.9	149.0	123.1	142.6	53.2	37.7
Greenland[d] (135)	193.7	147.4	123.5	144.7	53.3	36.6
Chipewyan[e] (44)	193.5	153.7	125.3	149.6	55.1	39.7

[a] Seltzer 1933, Jenness 1923*b*
[b] Jenness 1923*b*, Seltzer 1933
[c] Birket-Smith 1940
[d] Gessain 1960
[e] Grant 1930

icance of distance measurements cannot be calculated.

The relationships of the populations under discussion may be compared by calculating biological distance on the six measurements available between pairs of population samples, using Penrose's (1954) coefficient of total population distance (C_H^2). This coefficient is simply the mean square distance between two sets of sample means, after each mean has been given equal weight through division by the pooled standard deviation of the mean involved:

$$C_H^2 = \frac{\Sigma (d_i^2)}{n}$$

where

d_i = the difference between adjusted means for two samples on the i^{th} measurement

n = the number of different measurements.

The C_H^2 values for the ten pairs of samples are listed in Table 4. In interpreting this table, the smaller coefficients are inferred to represent closer biological relationships, and the larger coefficients more distant relationships.

Two features of the C_H^2 array appear to be relevant to historical interpretation. First, the Alaskan and Copper Eskimo samples form a closely related group relatively distinct from the group formed by the Hudson Bay and Greenland Eskimo samples; the analysis of variance measurements cited previously reflects this pattern and suggests that it is statistically significant. Secondly, the Chipewyan sample is much closer to the Copper and Alaska group than to the Greenland and Hudson Bay group; the size of the differences between coefficients suggests that this difference is also statistically significant. These mean square distance measurements parallel the comparisons by which Seltzer (1933: 368) concluded that Copper and North Alaskan Eskimo shared a distinct Athabaskan racial mixture, which was not present in eastern Eskimo populations.

Before interpreting these patterns in terms of historical relationships, one may carry the analysis further and gain additional information by breaking down the total distance coefficient (C_H^2) into the two component factors identified by Penrose (1954): "size distance,"

$$C_Q^2 = \frac{(\Sigma d_i)^2}{n^2}$$

= the amount contributed to total

Table 4

Penrose Total Distance Coefficients

	Greenland	Hudson Bay	Copper	Alaska	Chipewyan
Greenland					
Hudson Bay	076				
Copper	295	297			
Alaska	.216	.222	.078		
Chipewyan	.724	.594	.284	333	

distance by absolute size difference on all *d* values.

"shape distance,"

$$C_z^2 = \left(\frac{\Sigma(d_i)^2}{n} - \frac{(\Sigma d_i)^2}{n^2}\right)\left(\frac{n}{n-1}\right)$$

= the amount contributed to total distance by variation between the *d* values.

In the present case, the size distance measures the difference in absolute cranial size as defined by the six measurements used; the shape distance gives a measure of difference in cranial shape as it is reflected by the relationship between the six measurements. Table 5 lists size and shape distances between the 10 pairs of populations to be compared.

At least three features of the size-shape matrix may be relevant to historical interpretation. First, the Copper Eskimo population is closer to the Alaskan than to the eastern Eskimo populations with regard to both cranial size and shape. Secondly, the size of the Copper Eskimo crania is outside the size range of the Alaskan and eastern Eskimo populations; the shape of the Copper Eskimo crania, however, is intermediate between those of the Alaskan and eastern Eskimo populations. Third, the similarity of the Chipewyan to the Alaska and Copper Eskimo group is due entirely to similarity in absolute cranial size. The Chipewyan have larger crania than have any of the Eskimo populations; Copper Eskimo crania are closely similar, Alaskan Eskimo crania are somewhat smaller, and those of Greenland and Hudson Bay Eskimo are much smaller. The Chipewyan are not closer to the western than to the eastern Eskimo populations with regard to shape distance; they most resemble the Hudson Bay Eskimo, but even in this case the shape distance is larger than that between any two Eskimo populations.

The distinction between size distance and shape distance may be useful in interpreting inferred biological distance in terms of historical relationships. One first notes that the patterning of these variables appears to preclude the possibility that the Copper Eskimo developed in complete isolation, related to other Eskimo populations only through a common Thule ancestry. Secondly, the distribution of size distances is closely parallel to that noted for the majority of blood group gene frequencies; in both cases the Copper Eskimo occupy an extreme position, closer to the Alaskan Eskimo than to central and eastern Eskimo populations, and approaching the position of northern Athabaskan Indians.

Since the selective and environmental factors that act on cranial size are not known, the pattern of size distance distribution is difficult to interpret. The fact that this pattern

Table 5

A. Penrose Size Distance Coefficients

	Greenland	Hudson Bay	Copper	Alaska	Chipewyan
Greenland					
Hudson Bay	001				
Copper	218	192			
Alaska	099	082	023		
Chipewyan	476	438	050	142	
B. Penrose Shape Distance Coefficients					
Greenland					
Hudson Bay	091				
Copper	093	126			
Alaska	140	168	066		
Chipewyan	297	188	281	230	

appears to follow that noted for several blood group systems, however, suggests an interpretation similar to that made previously: the existence of an important axis of contact and genetic interchange along the Arctic coast between North Alaska and the Copper Eskimo area, combined with the possible introduction of some genes from northern Athabaskan populations.

The range of shape distances between pairs of Eskimo populations is much smaller than that of size distances, indicating that cranial shape as defined by the six measurements listed above is much more uniform throughout the Eskimo area than is cranial size. This pattern is probably due to the common Thule ancestry of all the Eskimo populations considered, plus the fact that cranial shape is less easily altered by environmental selection or genetic drift than is cranial size. With regard to cranial shape the four Eskimo populations form a distinct unit, which contrasts with the Chipewyan population. The uniformity of cranial shape throughout the Eskimo populations, as well as the rather even correlation of shape distance with geographical distance, suggests that no significant Palaeo-Eskimo or Dorset genetic residuum is to be found among any of the populations tested. This conclusion is, of course, based on the assumption that the Dorset and Thule populations are genetically distinguishable at the level of analysis used in the above discussion. This assumption is probably adequate but cannot be defended until rates of morphological change in human populations are determined with greater precision than they are now.

Lexical Traits

Comparative linguistics was one of the methods used by Jenness (1923*a*) in his original discussion of the inland origin of the Copper Eskimo. The evidence available at that time suggested to Jenness that the Copper Eskimo dialect was closely related to those of other Central Eskimo populations west of Hudson Bay and quite distinct from the dialects of the Mackenzie and North Alaskan Eskimo. Much additional information has become available since that time, especially in the comparative vocabularies collected by Rasmussen and Birket-Smith during the Fifth Thule Expedition. The following discussion is based primarily on a comparison of these vocabularies, collected by two closely associating ethnographers using a similar orthography.

Perhaps the most obvious and simple method of comparing a group of dialects is to count the number of cognates shared by pairs of dialects. This lexicostatistical method has been used mainly in terms of glottochronology, and the limitations imposed by the glottochronological method have not been conducive to an intensive examination of the closely related Inupik Eskimo dialects. The only previous attempt at a lexicostatistical examination of much of the material dealt with here is that of Hirsch (1954), which led only to the inconclusive suggestion that the Caribou and Iglulik Eskimo dialects were more distantly related to those of North Alaska than was the Greenland dialect.

The primary problem in this situation arises from the extreme similarity of the Inupik dialects, which results in small and statistically insignificant differences between cognate counts. Part of this problem may be overcome by abandoning the 100- or 200- word lists used for glottochronology, thus giving up any attempt at precise absolute dating of historical events but gaining a larger sample and more reliable results. Secondly, by relaxing standards of statistical significance and examining data that would be rejected by a more rigorous methodology, we may retrieve some useful information.

The following comparison is based on a sample of 300 root words, the maximum number available for all six dialects compared:

West Greenland	(Birket-Smith 1928)
Iglulik	(Birket-Smith 1928)
Caribou	(Birket-Smith 1928)
Netsilik	(Birket-Smith 1928)
Copper	(Rasmussen 1932; Jenness 1928)
North Alaska	(Rasmussen 1941)

The North Alaskan dialect selected for comparison is that of the *Kangianermiut* of the Colville River region. This is supplemented by a few words from the Mackenzie dialect (Rasmussen 1942) and that of coastal North Alaska (Jenness 1928); Hirsch (1954) demonstrated that these three dialects are very similar, and we are probably safe in thus supplementing the main list.

Fortunately, the close relationship of all Inupik Eskimo dialects facilitates the recognition of cognates, even by a non-linguist, once a few important phonetic shifts are recognized and taken into account. Cognates are counted for each pair of dialects, and the relation between each pair is described by a correlation coefficient, r_n, as defined by Ellegard (1959: 142):

$$r_n = \frac{a}{a + b}$$

where

a = the number of cognates

b = the number of non-cognate words.

The resulting matrix of coefficients is presented in Table 6, which also lists approximate levels of significance for differences between coefficients (calculated by Chi square tests on raw cognate counts). Large values of r_n represent a large number of shared cognates and an inferred close relationship between the two dialects compared. The word lists and cognates are tabulated in the Appendix.

Table 6

Correlation Coefficients on Cognate Counts

	Alaska	Copper	Netsilik	Iglulik	Caribou	Greenland
Alaska						
Copper	860					
Netsilik	810	870				
Iglulik	803	853	863			
Caribou	787	850	867	850		
Greenland	810	840	847	870	833	
A difference between r_n's of greater than			03	05	07	
is significant at approximately this level			30	10	05	

Examination of Table 6 indicates that the degree of similarity between dialects is roughly proportional to the geographical distance between dialect communities. Although the differences between coefficients do not appear to be highly significant, the coherence of the pattern of coefficients suggests that this pattern gives a true picture of the relationship between the dialects compared. To analyze the pattern further, it is necessary to deal with one of the confusing features of the r_n coefficient. This simple coefficient is quite useful for comparing single pairs of dialects, but for a series of related pairs it does not take into account the relationship of each dialect to all other dialects compared. Thus some dialects (e.g., Copper Eskimo) are more highly correlated with all other dialects than are others (e.g., Alaskan Eskimo); a high coefficient involving the Copper Eskimo dialect may mean something different than a high coefficient involving the North Alaskan dialect. To overcome this difficulty one may apply a simple factor analysis, such as that devised by Herdan (1964: 125-27), which is actually an adaptation of Spearman's original two-factor solution to a linguistic problem.

If one assumes that one general factor (e.g., descent from a single common parent dialect) is responsible for most of the observed correlation, then the value given by the following formula may be considered to be the "saturation" of each dialect by the single general factor:

saturation

$$g_i = \left(\frac{A_i^2 - A'_i}{T - 2A_i}\right)^{\frac{1}{2}}$$

where A_i = the i^{th} column sum of r_n (from Table 6)

A'_i = the i^{th} column sum of $(r_n)^2$

T = the sum of all A_i.

The "specificity" of each dialect, the result of factors bringing about the differentiation of each dialect from all others of the group, may then be calculated by the following formula:

specificity

$$s_i = (1 - g_i^2)^{\frac{1}{2}}$$

The calculations of saturation and specificity values are presented in Table 7.

As can be seen from Table 7, the saturation of all dialects by the general factor is extremely high, total saturation being represented by a value of 1.0 and our observed saturations ranging from .880 to .935. These values may be permitted to represent common inheritance from a single parent dialect, which may be

Table 7

Saturation and Specificity Values on Cognate Counts

Dialect	A	A′	Saturation	Specificity
Alaska	4.070	3.316	.880	.474
Copper	4.273	3.652	.935	.354
Netsilik	4.257	3.627	.931	.365
Iglulik	4.239	3.597	.926	.377
Caribou	4.187	3.510	.912	.410
Greenland	4.200	3.530	.915	.402

termed Thule Inupik. Secondly, the specificity values are lowest among the central dialects (Copper, Netsilik, Iglulik) and higher in peripheral areas; this pattern is hostile to any interpretation involving acculturation of the central dialects by a non-Thule Inupik dialect community, such as northern Indians or the descendants of the Dorset culture people.

The nature of secondary factors involved in the development of the pattern observed above may be suggested by comparing saturation scores with the original r_n coefficients. If one assumes that correlation is entirely the result of a single factor represented by the saturation scores, the degree of correlation between any two dialects should be equal to the product of the saturation scores involved (Herdan 1964: 126). In other words, the product of the saturation scores yields the expected correlation of two dialects if there is only one factor involved in the correlation. By comparing this *expected* correlation ($g_i \times g_j$) with the *observed* correlation (r_n), one can determine the amount of correlation that is due to secondary factors. Table 8 lists the saturation products for all 15 dialect pairs.

The seven dialect pairs for which the observed correlations are equal to, or higher than, the expected values are underlined in Table 8. In six of these cases, the high observed correlations are between geographically contiguous dialect communities. This pattern, which is a more precise reflection of the previously observed correlation of r_n values with geographical distance, suggests that the most important secondary factor involved in the correlations has been continuing contact and linguistic borrowing between contiguous dialect communities. The seventh case of high observed correlation, that of the Greenland and Alaskan dialects, is anomalous. If this is considered to be significant, it might suggest contact between Greenland and Alaskan dialect communities in the prehistoric period, perhaps along a contact route that existed through Parry Channel and to the north of the Central Eskimo territory.

An alternate explanation involves the appearance of lexical innovations, which became diffused between groups in the central Arctic but reached neither peripheral zone. If this hypothesis is correct, one must decide whether or not the innovations appearing in the central dialects were due to the intrusion of a Palaeo-Eskimo, Dorset, or Indian element into this area. The greatest lexicostatistical difference between any pair of dialects examined, that between Caribou and North Alaskan Eskimo, is 79 per cent shared cog-

Table 8

Saturation Products for Cognate Counts

	Alaska	Copper	Netsilik	Iglulik	Caribou	Greenland
Alaska						
Copper	823					
Netsilik	819	870				
Iglulik	815	866	862			
Caribou	803	853	849	845		
Greenland	805	856	852	847	834	

nates. Glottochronology, using a list of more "conservative" words, would predict that this amount of divergence could occur between two isolated dialects in a minimum time period of roughly 500 years. Since our historical framework suggests that the period of divergence of these two dialect communities may be 800 to 1,000 years, there is no need to account for divergences in the Central Eskimo dialects by the introduction of a Palaeo-Eskimo, Dorset, or Indian linguistic element.

Inadequate information on other than lexical characteristics of the Inupik dialects, plus the author's admitted inability to deal with the evidence which is available, precludes any further comparison of linguistic attributes. The historical interpretations made on the basis of lexical comparisons may be summarized in terms of three general statements:

(1) the high degree of similarity of all six dialects suggests that they diverged from a single parent dialect, which may be termed Thule Inupik;

(2) the low degree of divergence between the Central Eskimo dialects is consistent with development of these dialects in isolation from dialect communities of non-Thule Inupik ancestry;

(3) the lexical evidence suggests the importance of contact and linguistic diffusion between contiguous dialect communities in prehistoric times. This in turn suggests that the geographical position of these dialect communities relative to one another remained stable for some time preceding the historic period.

Material Culture

Evidence derived from the distribution of material culture elements has been the mainstay of hypotheses concerning the inland origin of the Copper Eskimo and of Central Eskimo culture in general. The most enlightening discussion on this subject occurs in a pair of polemic articles by Birket-Smith (1930) and Mathiassen (1930). Besides presenting much of the relevant evidence, these articles clearly illustrate the misuse of distributional criteria that has led to the present lack of interest in historical distribution studies.

Meticulous and exhaustive distributional studies of material culture elements may lead to quite exciting results in the interpretation of historical relationships. The high degree of similarity between the material cultures of all historic Eskimo groups, however, results either in a dependence on the comparison of a few major elements more likely to reflect ecological than historical relation-

Table 9

Correlation Coefficients on Material Culture Elements

	Alaska	Copper	Netsilik	Iglulik	Caribou	Greenland	Thule
Alaska							
Copper	774						
Netsilik	737	796					
Iglulik	694	720	861				
Caribou	672	689	826	861			
Greenland	834	758	726	742	700		
Thule	828	853	837	764	720	892	
A difference between r_n's of greater than			05	07	09		
is significant at approximately this level			30	10	05		

ships, or in minor differences in the forms of material culture elements, many of which are intrinsically unimportant. In this situation, an unhealthy respect for the immutability of culture elements, combined with the use of unfounded assumptions regarding the historical significance of formal and distributional criteria, leads to quite ambiguous interpretations. These difficulties may be partly overcome by ignoring the distribution and historical development of individual culture elements, and by comparing a large population of equally weighted elements on the single assumption that the cumulative effect of all processes influencing change in material culture will produce differences between pairs of groups that are proportional to the amount of isolation that has occurred between the groups. I would not wish to defend this assumption as the basis of a general method of cultural comparison; for present purposes, however, it seems adequate to the rather crude level of interpretation required.

Birket-Smith (1945: 220-25) compiled a comparative list of 250 material culture elements for seven historic Eskimo groups and four prehistoric cultures. This list, which has been amended by the addition of new data on the Copper Eskimo and Thule cultures, may be used to obtain a quantitative measure of similarity between the six groups discussed in the previous sections (n = 186), as well as between these groups and Thule culture (n = 137). The correlation coefficient used is r_n, the same coefficient employed to compare lexical items, and the same simple technique of factor analysis is used to isolate an assumed major correlational factor. The values of r_n are listed in Table 9, the saturation values in Table 10, and the saturation products in Table 11.

Although the correlations obtained from comparison of material culture elements are somewhat lower than those obtained on lexical items, they are still fairly high and follow the same general pattern. The high correlation of all historic groups with Thule culture suggests that the correlations between historic groups are largely the result of common descent from Thule culture. The extremely high saturation value (.935) of the Thule culture coefficients, based on a trait list designed for the comparison of historic groups, also suggests this interpretation. One may assume that in this case the single general factor

Table 10

Saturation and Specificity Values on Material Culture Elements

Population	A	A'	Saturation	Specificity
Alaska	4 539	3 458	854	520
Copper	4 590	3 529	865	501
Netsilik	4 783	3 828	910	415
Iglulik	4 642	3 617	878	480
Caribou	4 468	3 358	838	546
Greenland	4 652	3 635	879	476
Thule	4 894	4 013	935	354

Table 11

Saturation Products for Material Culture Elements

	Alaska	Copper	Netsilik	Iglulik	Caribou	Greenland	Thule
Alaska							
Copper	739						
Netsilik	777	787					
Iglulik	750	759	799				
Caribou	716	725	763	736			
Greenland	751	760	800	772	737		
Thule	798	809	851	821	784	822	

accounting for most of the correlation is descent from a common ancestor, represented by the archaeologically known Thule culture.

Five of the six cases in which observed correlation coefficients are higher than the expected (saturation product) values occur between geographically contiguous groups; again, as was the case with regard to lexical items, the Greenland-North Alaska coefficient is anomalously high. This situation again suggests that a secondary factor of some importance in correlation has been contact with and diffusion of material culture elements between contiguous groups whose geographical position has been relatively stable for some time prior to the historic period. Again one is unable to tell whether the relatively high Greenland-North Alaska coefficient is the result of an axis of contact that existed prehistorically to the north of the Central Eskimo area or of innovation that occurred in the central Arctic and did not diffuse to the peripheral zones. In a later section, the latter hypothesis will be discussed with regard to the possibility that innovation in the material culture of the Copper Eskimo was the result of diffusion from or amalgamation with a population of non-Thule ancestry or culture. The Copper Eskimo, it may be noted, show a greater number of non-Thule innovations (as distinct from losses of Thule culture elements) than do any of the other groups studied.

In summary, the distribution of material culture elements parallels that of lexical elements, and the conclusions of the linguistic analysis may be applied to the analysis of material culture. A more detailed analysis of Copper Eskimo material culture will be undertaken in association with the archaeological evidence presented later.

Inferences

The distributional patterns elucidated by the above analyses suggest the following general historical statements, which may be considered as hypotheses to be tested by archaeological methods:

(1) The high correlations of all Eskimo populations studied on most distributional attributes strongly suggest that these populations descended from a common Thule cultural and biological ancestry.

(2) The relatively high correlations between geographically contiguous groups suggest that the geographical positions of these groups have been stable for some time, and perhaps have not changed to any great extent since the original Thule occupation of the central and eastern Arctic. The most important axes of contact, genetic interchange, and cultural diffusion, appear to have been the following:

North Alaska-Copper
Copper-Netsilik
Netsilik-Iglulik-Caribou
Iglulik-(Baffin Island?)-Greenland
(Greenland-North Alaska?)

The last-named hypothetical axis of contact is predicated on the postulated existence of a series of large sea mammal hunting groups occupying Parry Channel and the Queen Elizabeth Islands in prehistoric times.

(3) The distinctiveness of the Central Eskimo populations and the Copper Eskimo in particular, relative to eastern and western Eskimo populations, does not require an explanation involving non-Thule ancestry. The extreme positions of Copper Eskimo blood group gene frequencies and cranial size, relative to other Eskimo populations, is not consistent with a Palaeo-Eskimo or Dorset ancestry; a more plausible explanation involves random genetic drift, slight Athabaskan genetic admixture, or more probably a combination of these processes. Cranial shape, as defined by the six measurements used, is too uniform throughout all Eskimo populations to suggest the possibility of any significant non-Thule genetic heritage. The lexicostatistical distance between any pair of Inupik dialects is glottochronologically consistent with development from a single Thule Inupik dialect. The statistical divergences of material culture assemblages parallel the pattern of lexical divergences and are consistent with development from a basic Thule cultural assemblage.

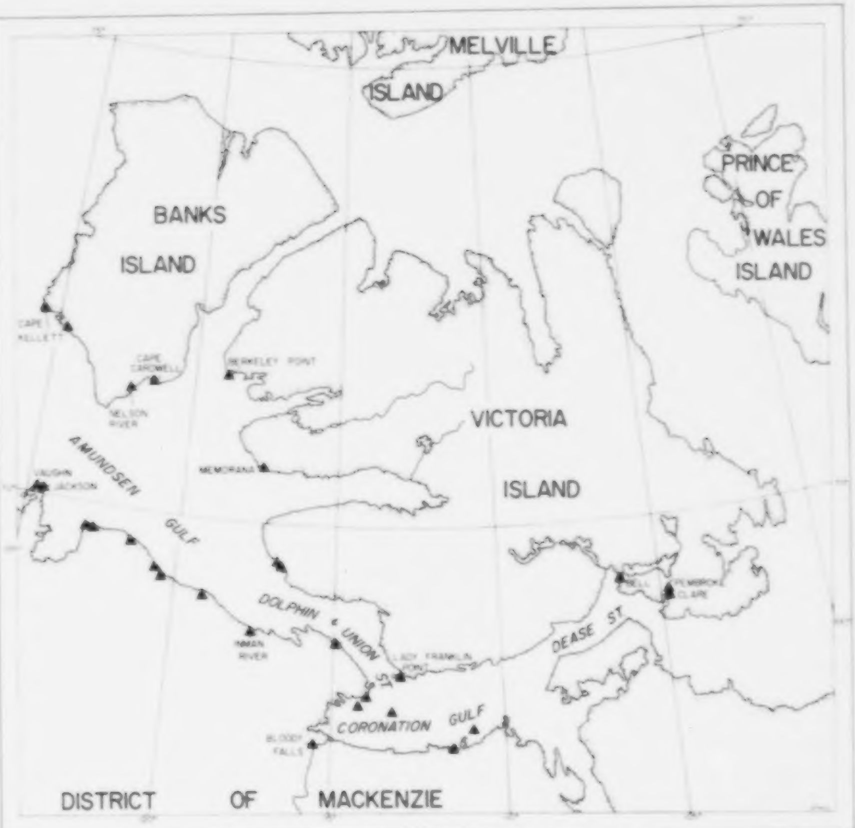

MELVILLE
ISLAND
BANKS
ISLAND
PRINCE
OF
WALES
ISLAND
CAPE KELLETT
CAPE CARDWELL
NELSON RIVER
BERKELEY POINT
VICTORIA
ISLAND
AMUNDSEN
GULF
MEMORANA
VAUGHN
JACKSON
DOLPHIN & UNION ST
INMAN RIVER
LADY FRANKLIN POINT
DEASE ST
PEMBROKE CAPE
CORONATION GULF
BLOODY FALLS
DISTRICT OF MACKENZIE

Fig. 2. Locations of Thule period sites.

The following chapter presents a brief description of archaeological evidence recovered during the summers of 1966 and 1968, when I investigated several sites in western Victoria Island and the vicinity of Coppermine. These sites are compared with the few other sites known from the Copper Eskimo region, and a tentative cultural sequence is constructed for the past 1,000 years. The evidence is most easily arranged in terms of three chronological periods: the Thule period, represented by the Memorana and Bloody Falls sites; the Intermediate interval, represented by the Kuujjua River sites; and the Historic period, represented by the Kunana site. The changes and continuities that can be detected between these periods and the implications for Copper Eskimo prehistory will be dealt with in later chapters.

The Thule Period

The Memorana Site

The Memorana site (OdPq-1) is located on the Amundsen Gulf coast of western Victoria Island, 9 miles southeast of the settlement of Holman

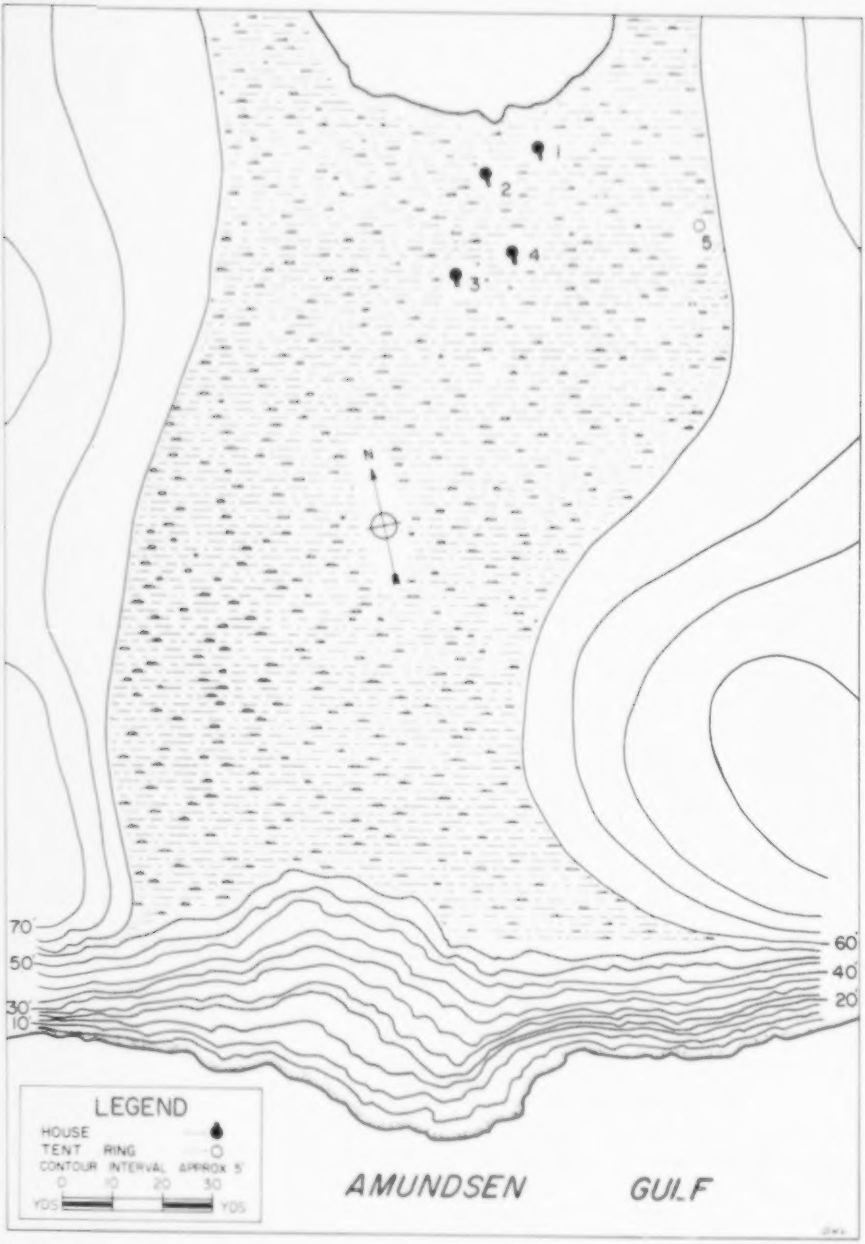

1
2
3
4
5
N
70'
50'
30'
10'
60'
40'
20'
LEGEND
HOUSE
TENT RING
CONTOUR INTERVAL APPROX 5'
0 10 20 30
YDS YDS
AMUNDSEN GULF

Fig. 3. Map of Memorana Site

(Fig. 2). The coast in this area is composed of basaltic cliffs up to 70 ft in height, dropping directly into deep water and forming a wide headland, which marks the northwestern corner of Prince Albert Sound. Both beluga and bowhead whales approach close to the shore in this vicinity. As a strong current flows past the headland, open water often extends to the shore throughout the winter and, according to local informants, the sea ice in the area is usually thin and is riddled with tide and current cracks. The location is an ideal lookout for whales, and the fact that many seals are shot in the open water off the site during the spring and summer suggests that it would have been a good locality for sealing from *kayaks*. During the winter, the site would have been excellently situated for sealing through tidal cracks and perhaps from the floe edge; ice-hole sealing could have been carried out on the more stable ice in the mouth of Prince Albert Sound south and east of the site. At present, the site area is not a good locality for fishing or for hunting caribou and muskox. Driftwood is found in small quantities along the coast on either side of the site.

Four winter houses are grouped together in a small boggy depression on top of the coastal cliffs, backed by a tundra pond and facing a steep 50-foot rockfall to the sea (Fig. 3). The houses are fairly small, and the midden deposits in front of each house are thin, suggesting a short occupation of the site. All four houses were excavated, and an estimated 90 per cent of the midden deposits recovered; a total of 230 lb of bone fragments, most of which apparently represents food refuse, were collected. If 10 per cent is added to this total to account for the unexcavated portions of the middens, a round figure of 250 lb of food refuse bone is obtained. Using Cook and Treganza's (1950: 245) estimate of 1 lb of dry bone to 20 lb of edible meat, this total represents approximately 5,000 lb of meat. If one further estimates that each house at the site was inhabited by five individuals, each consuming approximately 2 lb of meat per day (Usher 1965: 190), one may estimate an occupational duration of 125 days or approximately four months. Taking into account the amount of food probably consumed away from the camp, or not represented by bone refuse, this amount of refuse is consistent with a single winter occupation by a unit of approximately 20 people.

A total of 2,025 pieces of bone refuse were identified as to genus: 72 per cent of these bones were those of ringed seal, 26 per cent were of caribou, and only a very few bones represented whale, bearded seal, bird, fish, hare, and fox. These proportions suggest that sealing was the primary subsistence activity during the season that the site was occupied; sealing may have been done from *kayaks* in open water during the early winter, then perhaps continued from the floe edge or through tide cracks and breathing holes. The caribou bones may represent animals of the Dolphin and Union herd (Manning 1960: 7-10) that were killed prior to the fall migration to the mainland and stored for winter use, or animals of the resident Victoria Island population that were killed during the winter season; the latter alternative is suggested by the relatively large number of arrowheads found at the site. The presence of fish lures and spears suggests that some winter fishing was carried out, perhaps through the ice of a large lake, about five miles east of the site, which is a good winter fishing station at the present time.

Structures

All four houses were built according to the same general plan (Fig. 4). They appear to have been constructed on the original surface level, without excavation into the underlying waterlogged and frozen earth. The floor area was covered with the flat limestone slabs that occur in thin glacial drift mantling the area. A semicircular to rectangular rear platform was also built of slabs and raised 8 to 15 in above the floor level on two irregular rows of boulders and vertically placed slabs; in at least two of the houses, side benches were built in the same manner. The entrances, which all face southwest toward the coast, were built as slabwalled corridors approximately 2 ft wide and 8 to 10 ft long; there is no noticeable incline or cold trap in any of the entrance corridors. Concentrations of charcoal and burned oil were found beside the outer ends of two passages, suggesting that cooking hearths were located in this area. Small crude caches or storage niches were built along the sides of the entrance passages but do not appear to have opened into the passages.

The outer walls of the houses were built by piling turf around the edges of the floor and platform area. These walls now remain as oval turf rings 18 to 24 in high and 2 to 5 ft thick. The inner dimensions of the rings range from 6 by 10 ft to 8 by 14 ft, and the outer dimensions from 4 by 15 ft to 18 by 20 ft. A thinner layer of turf, found in the interior of the rings, was probably piled on the roofs of the houses. A few fragments of wooden posts were found, but they were too decayed to permit delineation of the pattern of roof supports; whale bone was not used as construction material.

The only other structure found at the site was a small tent ring. Isolated tent rings, caches, and other boulder structures are scattered over the ridges and on the gravel beaches to the north and south of the site, but most of these structures probably relate to a later period.

Artifacts

The artifacts found at the Memorana site are described in terms of the functional classes traditionally used by archaeologists of Eskimo cultures.

A. *Sea Hunting Equipment*

Sealing harpoon heads: 15 specimens

Fourteen of the 15 sealing harpoon heads found are of the Thule 2 type or variants thereof. The specimens range in total length from 85 to 180 mm and have a mean length of 141 mm. All are of antler, with flat cancellous dorsal surfaces and rounded cortical ventral surfaces. Concavely oblique butts extend to a single strong lateral spur, seven to the left and four to the right. Sockets are open, and three specimens have a small reinforcing bar of antler set into the distal end of the socket. Four specimens have a wide lashing bed, five have a pair of lashing slots, and one has a single lashing slot and a shallow bed. The line holes are drilled, and there is generally a shal-

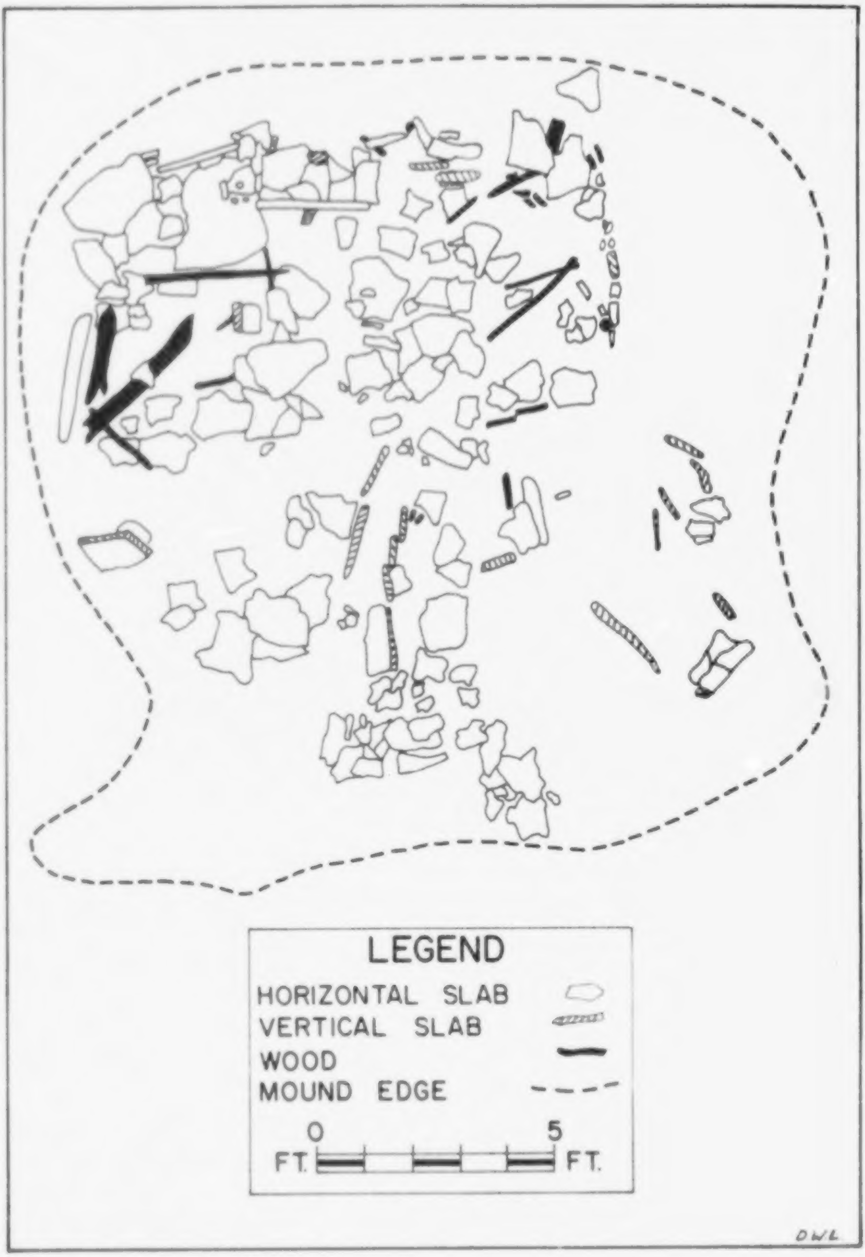
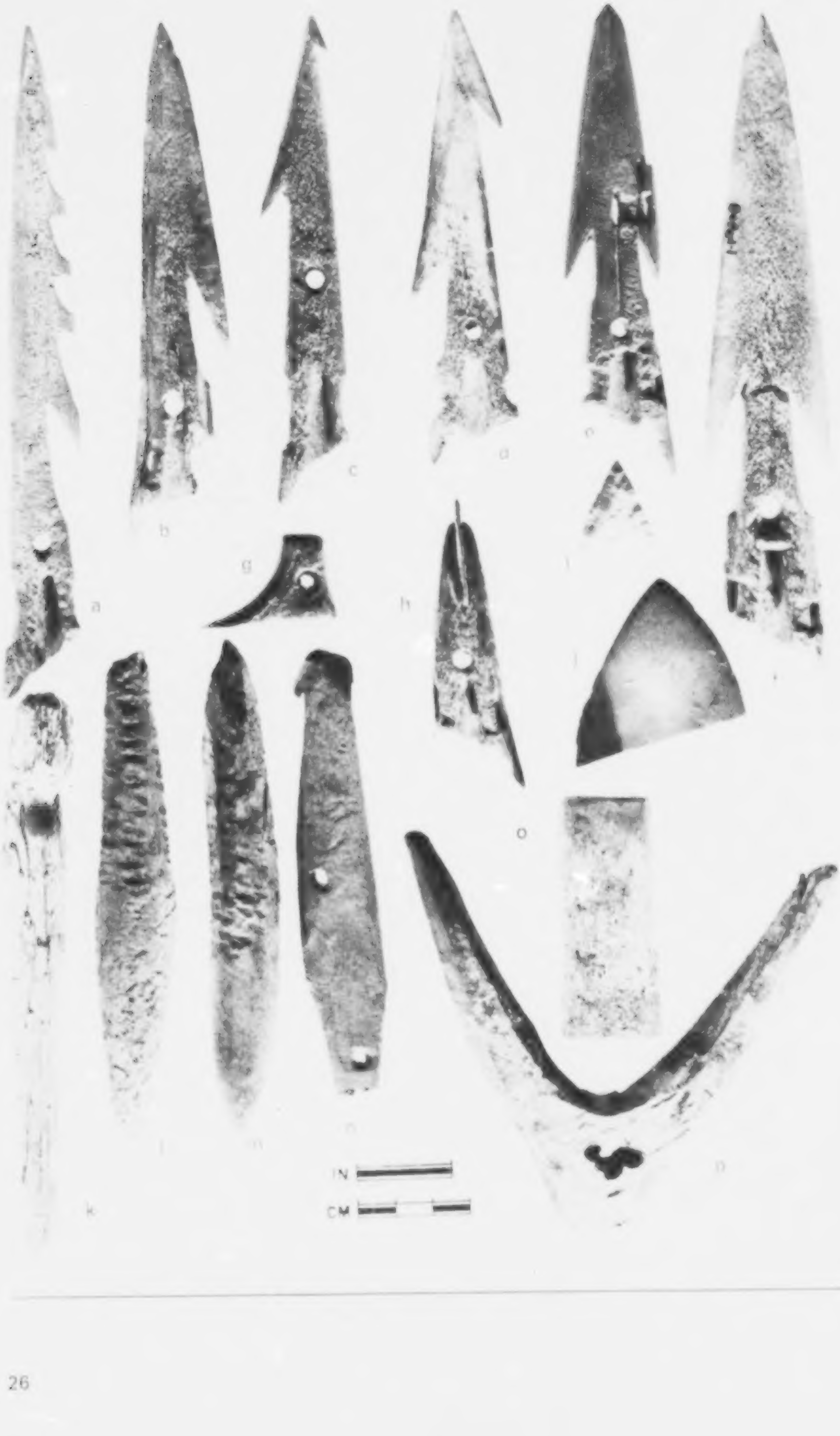

LEGEND
HORIZONTAL SLAB
VERTICAL SLAB
WOOD
MOUND EDGE
0
5
FT.
FT.
DWL

Fig. 4 Memorana Site, plan of House 1

Communications Division
National Museum of Man


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
IN
CM

low groove on the ventral surface proximal to the line hole and expanding laterally to the lashing slots. Six specimens are decorated with single or double converging lines running distally from the line hole on the ventral surface; two lines have a distal "Y" decoration, and on one the "Y" is proximal. Only eight of the 14 specimens have the pair of symmetrically opposed barbs, characteristic of the Thule 2 type (Plate I, figs. e,f). Two specimens have a single strong barb on the edge opposite the spur (Plate I, fig. b); three specimens have one strong barb and a second smaller one on the opposite edge near the distal end (Plate I, figs. c,d). One specimen has five unilateral barbs (Plate I, fig. a). One specimen (Plate I, fig. h) is of the Thule 3 type, 76 mm long with oval cross-section; the concavely oblique butt extends to a sharp lateral spur, on the ventral surface of which is a small knob, which may be a vestigial second spur. The socket is open, and there is a single pair of lashing slots, from each of which extend short proximal and distal grooves. The line hole is drilled; the end blade socket parallel to it contains a triangular copper end blade with a small hole near each basal corner; thongs extending proximally from these holes probably passed through the line hole and thus held the end blade in place.

Plate I
Memorana Site: Sea Hunting Equipment
a. Harpoon head, Thule type 2 variant
b. Harpoon head, Thule type 2 variant
c. Harpoon head, Thule type 2 variant
d. Harpoon head, Thule type 2 variant
e. Harpoon head, Thule type 2
f. Harpoon head, Thule type 2
g. Harpoon finger rest
h. Harpoon head, Thule type 3
i. Harpoon end blade (Dorset ?)
j. Harpoon end blade
k. Throat plug (?)
l. Harpoon ice pick (?)
m. Harpoon ice pick (?)
n. Darting harpoon head
o. Harpoon foreshaft socket
p. *Umiak* harpoon rest

Harpoon end blades: 2 specimens

One small triangular end blade with concave base is chipped from mottled brown chert (Plate I, fig. i); it has a maximum length of 28 mm, basal width of 22 mm, and maximum thickness of 3 mm. This specimen, very likely a late Dorset culture artifact, may have been collected by the occupants of the site. The second specimen is the tip fragment of a large slate end blade ground in shallow facets to sharp lateral edges and a sharp point (Plate I, fig. j); maximum length is over 50 mm, basal width over 45 mm, maximum thickness 3 mm.

Harpoon foreshaft socket: 1 specimen

The one cylindrical socket made from whale bone is 65 mm long, 24 mm in external diameter, with walls 4 mm thick; one end is cut square, while the other is thinned to a sharp lip (Plate I, fig. o).

Harpoon finger rests: 2 specimens

Both specimens, made of antler, are of the standard Thule form, with concave base designed to fit against the harpoon shaft and with a lateral drilled hole to contain lashing. The proximal edge, against which the finger is to rest, is perpendicular to the shaft and 20 mm long; the distal face slopes directly to the shaft on one specimen, while on the other (Plate I, fig. g) it is elongated to a total length of 37 mm.

Harpoon shaft: 1 specimen

One fragment of wooden shaft, 300 mm long with circular cross-section

20 mm in diameter, is possibly a harpoon shaft.

Harpoon ice picks (?): 5 specimens

Two heavy pointed rods of whale bone and three of antler range in length from 92 to 160 mm with mean length of 127 mm. Distal ends are either sharply pointed or blunt and battered, while the proximal ends are crudely tapered and scarfed for attachment (Plate I, figs. l, m). One specimen has a drilled lateral hole 35 mm from the distal end. These specimens may be ice picks for mounting on the butt end of harpoon shafts, a standard Thule type.

Umiak harpoon rest: 1 specimen

A V-shaped segment of antler is perforated near the base by a cruciform hole formed by drilling; the specimen is broken below this hole, suggesting that it was originally Y-shaped (Plate I, fig. p). A similar specimen has been described by Ford (1959: 157) as a crotch for resting the whaling harpoon while whaling from the *umiak*. Length is 105 mm, distance between tips of the V is 115 mm, thickness 15 mm.

Throat plug (?): 1 specimen

A conical wooden object 150 mm long is cut to a blunt distal point from which it expands proximally to a diameter of 18 mm, contracts unilaterally to form a shallow neck, then expands to a rounded proximal head (Plate I, fig. k). This specimen bears a faint resemblance to throat plugs used by the Angmagssalik Eskimo for towing seals behind the *kayak* (Mathiassen 1933: 116); Taylor (n.d.) reports similar but much more finely made specimens from the Vaughn and Jackson sites at Cape Parry.

Darting harpoon heads: 2 specimens

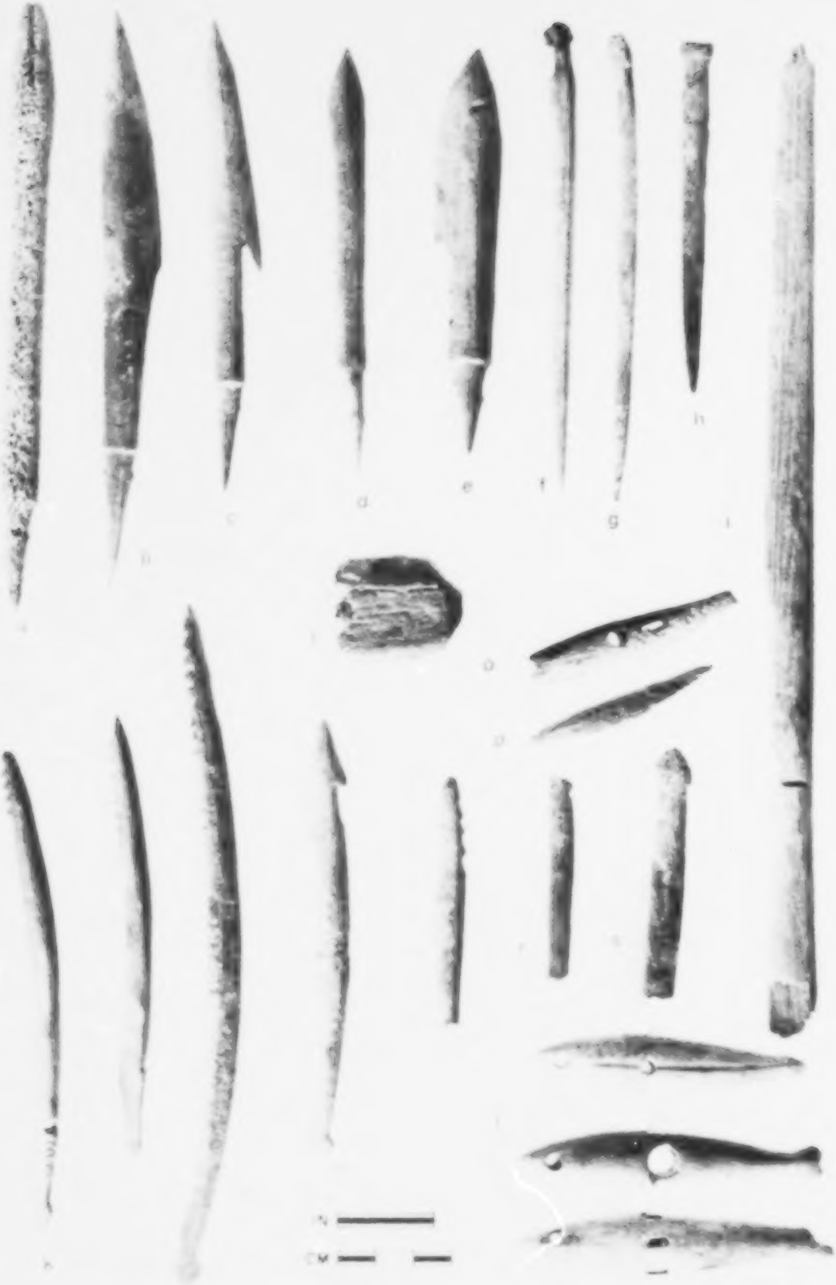
One incomplete specimen is made of antler, and has had both distal and proximal ends removed; it is 121 mm long with flat oval cross-section (maximum 23 by 7 mm) and has a single pair of symmetrical lateral barbs at the distal end. The proximal tang is tapered and wedge-shaped, with one marginal line hole and a second smaller hole near the butt (Plate I, fig. n). The second specimen, also incomplete, has a thicker cross-section (maximum 19 by 11 mm), and at least one pair of asymmetric lateral barbs; both distal and proximal ends are missing.

B. *Land Hunting Equipment*

Arrowheads: 15 specimens

All 15 arrowheads have conical tangs, set off from the stem by a sharp shoulder and bearing a pair of small opposed spurs, generally placed symmetrically at the same distance from the tip. One specimen, of whale bone, is 160 mm long, with circular

Plate II
Memorana Site: Land Hunting and Fishing Equipment
a Arrowhead
b Arrowhead
c Arrowhead
d Arrowhead
e Arrowhead
f Wound pin
g Wound pin
h Wound pin
i Toy bow fragment
j Bolas ball
k Bird dart side prong
l Bird dart side prong
m Bird dart side prong
n Bird dart side prong
o Fish spear barb
p Fish spear barb
q Fish spear centre prong (?)
r Fish spear centre prong (?)
s Fish spear centre prong (?)
t Fish spear lures


a
b
c
d
e
f
g
h
i
o
p
k
IN
CM

cross-section expanding to a bulbous distal end with end blade slot (Plate II, fig. a). The remaining specimens are of antler and range in length from 105 to 152 mm with mean length of 128 mm. One (Plate II, fig. d) has a simple lanceolate blade, while the remainder have a single more or less pronounced lateral barb (Plate II, figs. b, c). One specimen (Plate II, fig. e) is decorated unifacially with an incised line from the base of the barb to the distal end and asymmetrically placed spurs on the tang.

Arrowshafts: 4 specimens

Four fragments of wooden shafts, which have circular cross-sections and diameters of 6 to 9 mm, may be arrowshafts.

Wound pins: 7 specimens

All are of antler with sharp distal point and narrow neck expanding to a small proximal head (Plate II, figs. f-h). Cross-sections are either lanceolate with two sharp edges (1 specimen), triangular with three sharp edges (3 specimens), or rhomboid to square (3 specimens). Lengths range from 92 to 135 mm with mean length of 117 mm.

Wooden bows: 7 specimens

Three fragments from the ends of small wooden bows have squared or rounded terminal nocks and flat oval cross-sections ranging from 11 by 3 mm to 16 by 6 mm. On one specimen (Plate II, fig. i) the back is flat whereas the front is convex and expands to a central hand-hold; this simple bow, which appears to have been made from a single piece of wood, is approximately 400 mm long. Four other fragments of flat wooden splints may have been broken from similar small or toy wooden bows which are characteristic of Thule culture.

Bird dart side prongs: 4 specimens

All specimens are slightly curved rods of antler with flat oval cross-sections; the proximal ends are flattened for insertion into slits in the dart shaft and are equipped with unilateral projections to contain lashing. One specimen (Plate II, fig. n), which is 117 mm long and bears a single pair of large asymmetric distal barbs, approaches the standard Thule form. The remaining three specimens (Plate II, figs. k-m) are larger, 120 to 183 mm in length, and instead of large bilateral barbs have a series of small unilateral serrations along the concave edge.

Bolas ball: 1 specimen

This specimen (Plate II, fig. j), a crudely shaped cylinder cut from whale bone, has two joined holes drilled through the narrow longitudinal edge; maximum dimensions are 32 by 27 by 18 mm.

C. *Fishing Equipment*

Fish spear barbs: 4 specimens

One incomplete specimen (Plate II, fig. o) is a variant of the standard Thule type, with one flat face for mounting against the fish spear prong and two holes, one drilled and one gouged, for lashing the barb in place. Three other small antler barbs, 50 to 60 mm long, have one flat face scarfed for mounting and the opposite end tapered to a sharp point (Plate II, fig. p); they may be simple barbs for a small type of fish spear.

Fish spear centre prongs (?): 3 specimens

Three small broken antler rods, 55 to 70 mm long, have flat oval cross-sections and small bilateral barbs near the distal ends (Plate II, figs. q-s). They are tentatively identified as centre prongs for small fish spears.

Fish spear lures: 3 specimens

Three models of fish, probably representing *Salvelinus*, are finely carved from antler (Plate II, fig. t). All are approximately 80 mm long, have drilled eye-holes, and drilled or gouged holes for suspension; one specimen is decorated with a hatched line from eye to tail on both sides of the fish. This is a common Thule form.

D. *Transportation Equipment*

Trace buckle: 1 specimen

The single dog harness trace buckle is a flat trapezoidal bar of antler 57 mm long, 20 mm wide, and 7 mm thick (Plate V, fig. d). Two parallel holes have been drilled through the bar to make a trace buckle of the standard Thule type.

E. *Men's Tools*

Knife handles: 9 specimens

One fragmentary handle is made from a cylindrical section of antler over 150 mm long, with a distal blade slit 40 mm long and open to both sides (Plate III, fig. a); this is probably a variant of Mathiassen's (1927*b*: 68) Thule type 1 knife handle. One complete specimen (Plate III, fig. b) accords with Mathiassen's (1927*a*: 69) Thule type 2; this is an antler handle 150 mm long with oval cross-section 17 by 12 mm, small enclosed blade socket in the distal end, and drilled suspension hole near the proximal end. Two similar specimens are much smaller, and one (Plate III, fig. c) contains a fragment of an iron blade; the proximal ends of both specimens are missing. One incomplete specimen (Plate III, fig. d) is made on a curved and tapered section of antler tine 135 mm long, with a suspension hole near the proximal end and a small side blade slot near the distal end; this is a variant of Mathiassen's (1927*b*: 69) Thule type 3 or "crooked knife." A flat piece of antler cortex (Plate III, fig. e) 120 mm long, 16 mm wide, and 5 mm thick has been shaped by cutting and grinding; in one edge near the distal end is a shallow, open, semilunar side blade socket 20 mm long and 4 mm deep. A second fragment appears to represent the distal end of a similar knife; both specimens have a deep brown patination and are probably Dorset culture knives similar to those illustrated by O'Bryan (1953: Plate 8, figs. A-D) and Holtved (1944: Plate I, figs. 12-14).

Bow drill spindles: 2 specimens

Two wooden shafts (Plate III, figs. g, h), 170 and 173 mm long, have circular cross-sections 9 mm in diameter. The proximal ends are bluntly rounded, and the distal ends are tapered and sliced on one side for mounting the drill bit. One specimen has a rectangular expansion of the shaft 60 to 65 mm from the distal end, whereas the other has a rectangular expansion 75 to 80 mm from the distal end. These spindles are of a standard Thule type.

Whetstones: 2 specimens

Two irregularly shaped pieces of fine-grained igneous rock have one edge ground and polished flat (Plate III,

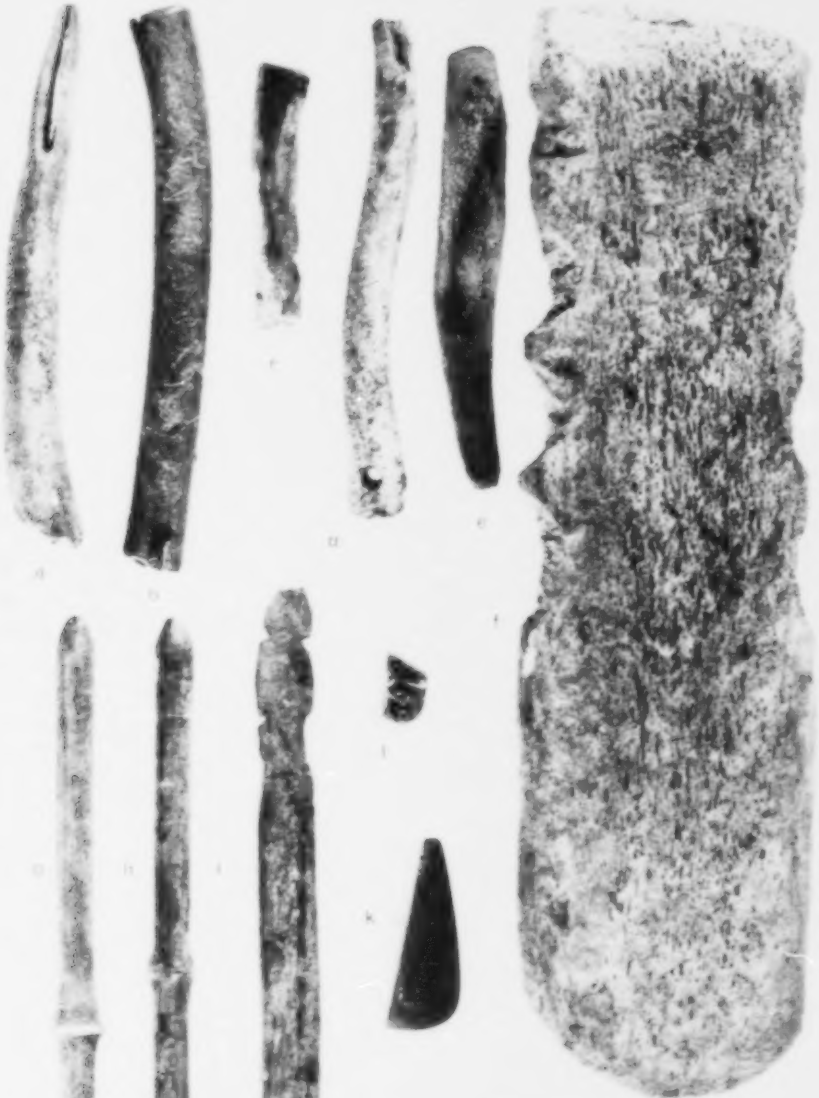

a
b
c
d
e
f
g
h
i
j
k
IN
CM

fig. k). Irregularly shaped whetstones are common in Thule assemblages.

Chert graver: 1 specimen

A small fragment broken from a flake of fine, translucent chert has fine bifacial nibbling retouch along two edges that converge to a sharp point (Plate III, fig. j). This type of stonework is not characteristic of Thule culture; the specimen may have been derived from a Dorset or Arctic Small Tool site.

Axe head: 1 specimen

An extremely fragmentary antler artifact resembles the standard Thule adze socket but appears to have been mounted as an axe (Plate III, fig. l). The artifact is 105 mm long, 43 mm wide, and 15 mm thick; one end is roughened to hold a lashing, which was probably used to bind the blade into a broken socket. Near the opposite end are two drilled holes from which run slight lashing grooves leading to a narrow edge that apparently was mounted against the handle.

Shovel (?): 1 specimen

This specimen has a flat spatulate wooden blade approximately 200 mm long, tapering from a convex distal edge 120 mm wide to a handle 40 mm wide; in the middle of the blade section there is a rectangular perforation 17 by 5 mm. The specimen appears to be a small shovel of a unique type.

Plate III
Memorana Site: Men's Tools
a. Knife handle, Thule type 1
b. Knife handle, Thule type 2
c. Knife handle, Thule type 2
d. Knife handle, Thule type 3
e. Knife handle, Dorset
f. Mattock head
g. Drill spindle
h. Drill spindle
i. Flaker handle (?)
j. Graver
k. Whetstone
l. Axe head

Mattock heads: 2 specimens

Two whale bone mattock heads are of standard Thule form. One complete specimen (Plate III, fig. f) is 195 mm long, 75 mm wide and 40 mm thick, with a flat seating for the handle and four pairs of shallow bilateral notches for hafting. The second specimen is incomplete but appears to have been generally similar.

Flint flaker handle (?): 1 specimen

A curved wooden shaft over 150 mm long is flattened and slightly curved toward one end, where there are two pairs of lateral lashing notches. This is perhaps the handle for a flint flaking tool similar to those described by Ford (1959: 172-173), although the identification is very uncertain.

F. *Women's Tools and Household Equipment*

Women's knife handles: 3 specimens

One specimen (Plate IV, fig. a) is a simple cylinder of antler 93 mm long and 20 mm in diameter with a straight groove cut along the entire length on one side; the groove is 3 mm wide, has a maximum depth of 6 mm at the centre and becomes shallower toward each end. The second (Plate IV, fig. b) is a flat and roughly rectangular chunk of antler with a slot 5 mm wide, 8 mm deep, and 85 mm long cut along one edge; maximum dimensions are 90 mm by 32 mm by 11 mm. The third specimen (Plate IV, fig. c) is a large section of palmate antler with smoothly rounded proximal edge and oval central perforation; the blade slot is 4 mm wide, 12 mm deep, and 130 mm long. Maximum dimensions are 145 by 13 mm. These handles resemble Mathiassen's (1927*a*: 58-59) types 1, 2, and 3 from the Thule site of Naujan.

Women's knife blades: 13 specimens

All of these slate blade fragments are fragmentary, and none shows the overall shape of the complete blade; cutting edges range from only slightly curved to a maximum curvature with radius of approximately 60 mm. All the blades, which are of fine dark slate, have been chipped to shape, then ground unilaterally or more usually bilaterally in shallow facets, which do not usually extend more than 5 mm from the edge; a few have grinding over the entire surface. Thickness ranges from 2 to 5 mm.

Scraper handle: 1 specimen

This specimen (Plate IV, fig. d) is simply a section of antler shaft 100 mm long with oval cross-section expanding from 33 by 21 mm at the proximal end to 52 by 15 mm at the distal end. The distal end contains a blade socket 30 mm long, 7 mm wide, and 15 mm deep. As there is no evidence that this specimen was lashed to a handle, it may be a scraper handle of unique type.

Fire drill hearth: 1 specimen

A fragment of spruce shaft 230 mm long and 25 mm in diameter contains three charred sockets 15 mm in diameter and 15 to 20 mm deep (Plate IV, fig. i). One end is cut obliquely as if for mounting against another section of shaft, suggesting that it may have been originally a harpoon shaft that has been used as a fire drill hearth of common Thule type.

Marrow spatula (?): 1 specimen

A thin wooden rod 183 mm long has a pointed proximal end expanding with circular cross-section to a somewhat flattened distal section 9 mm wide and 5 mm thick (Plate IV, fig. f). This may be a spatula used for digging marrow from caribou bones.

Wooden spoon: 1 specimen

This incomplete specimen appears to be the distal end of a flat wooden spoon (Plate IV, fig. e); the shaft has an oval cross-section 10 by 8 mm, expanding bilaterally into a flat spatulate head 55 mm long and probably about 30 mm wide. Small spoons of various shapes are a common Thule element.

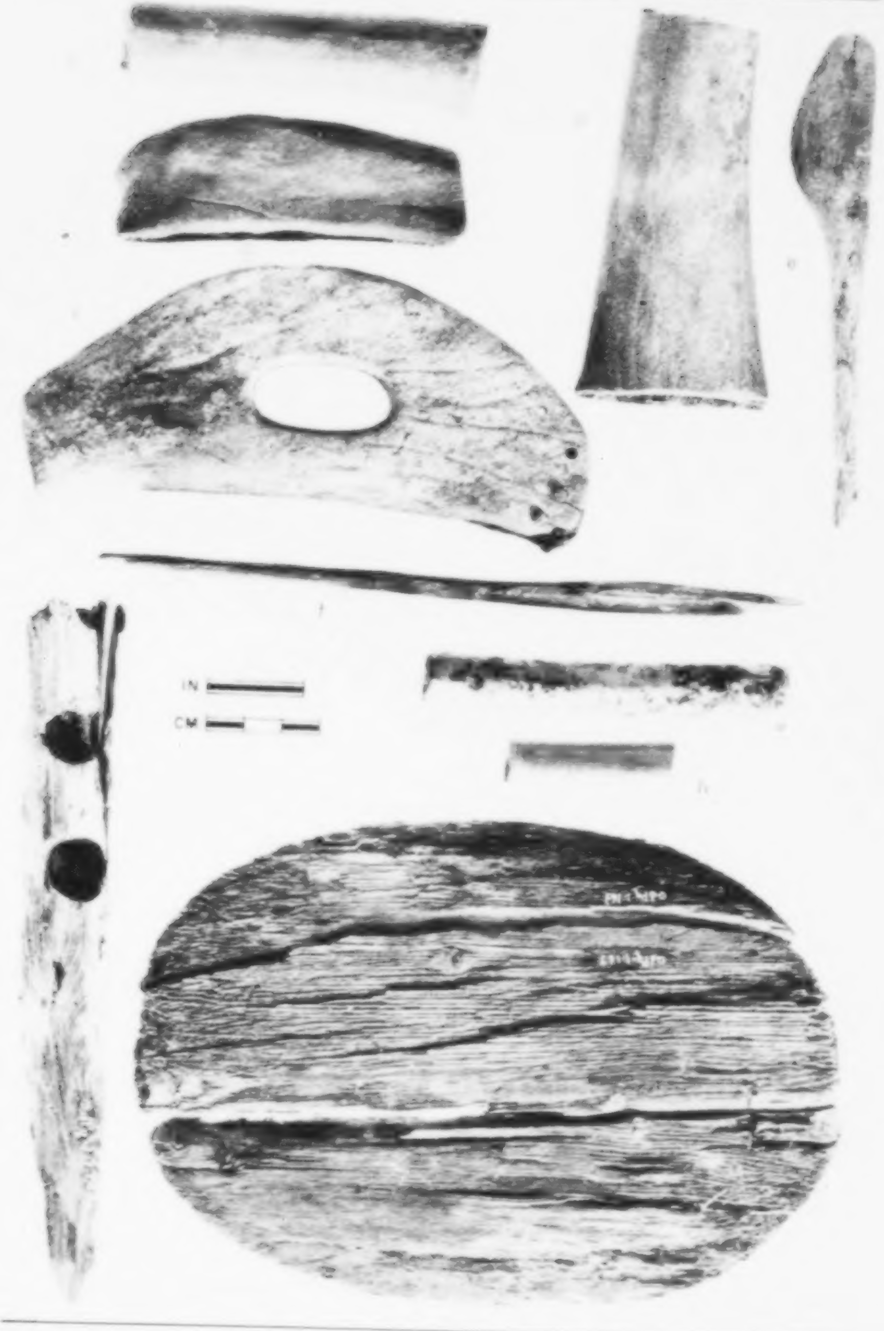
Needle cases (?): 2 specimens

Two pieces of round hollow bird bone are both 13 mm in diameter, 44 and 95 mm respectively in length: the ends of the bone have been cut square and smoothed (Plate IV, figs. g, h). These may have been used as a simple type of needle case.

Wooden vessel base: 1 specimen

A flat piece of spruce 12 mm thick is oval in outline, with maximum length 180 mm and maximum width 127 mm (Plate IV, fig. j). A longitudinal crack has been repaired by lacing baleen through two pairs of small holes, but there is no trace of attach-

Plate IV
Memorana Site: Women's Tools
a. Women's knife handle
b. Women's knife handle
c. Women's knife handle
d. Scraper handle
e. Wooden spoon fragment
f. Marrow spatula (?)
g. Needle case
h. Needle case
i. Fire drill hearth
j. Wooden vessel base


f
IN
CM
h

ment to the walls of the vessel. Vessels with wooden bases are a standard Thule type.

Soapstone vessel fragments: 13 specimens

All fragments are too small to reconstruct, but the larger pieces appear to have come from rounded vessels or lamps rather than pots with straight sides and square corners.

Pottery fragments: approximately 100 specimens

These sherds represent at least five vessels. Paste is generally black to dark brown and heavily tempered with coarse sand and gravel up to 10 mm in diameter, with some organic inclusions. Texture is extremely coarse, soft, and laminated; breakage usually occurs along coil lines or vertical laminations. The few sherds that are not broken along laminations range in thickness from 7 to 22 mm with mean thickness of 12 mm. The exterior surface is always black and sooty, and none of the sherds is decorated. The unthickened lips are simply rounded, and a few sherds show evidence of a slight shoulder 20 to 50 mm below the rim. A few of the rims show no curvature, and were probably parts of lamps; most, however, appear to be from pots with vertical or slightly convex walls and rim diameters of 200 to 300 mm. These sherds accord with MacNeish's (1956: 51-52) definition of Thule fibre-tempered ware.

G. *Miscellaneous*

Snow goggles: 2 specimens

These finely made whale bone snow goggles (Plate V, fig. a) have a smoothly curved outer surface, smoothly concave interior nasal section, and deeply gouged interior eyeholes with two narrow rectangular slits; the head attachment passed through two lashing holes at either end. A fragment of a wooden artifact may be from snow goggles more crudely made than those described above and perhaps made in two separate sections.

Whale effigies: 4 specimens

Four small carvings of whales were found. Two, made of stone, represent bowhead whales and have a flat dorsal surface (Plate V, figs. f, g). Two are of bone and may represent either whales or fish (Plate V, figs. h, i).

Dolls: 2 specimens

One small human effigy (Plate V, fig. c), carved from a soft white stone, is merely a silhouette figure. The second, carved from wood (Plate V, fig. b) and 70 mm high, lacks arms or facial and sexual features. Simple dolls of this sort are characteristic of Thule culture.

Toy harpoon head: 1 specimen

A small wooden harpoon head 47 mm long has a single spur, open socket with lashing bed, but no line hole, barbs, or end blade indicated (Plate V, fig. e).

Cylindrical bead: 1 specimen

A small barrel-shaped nephrite bead is 13 mm long with maximum diameter of 12 mm (Plate V, fig. j). The hole through the long axis, 3 mm in diameter, was drilled from both ends.

Teardrop pendant: 1 specimen

One globular pendant of soapstone (Plate V, fig. k) has a small drilled suspension hole in the narrow end; the ends of the hole are joined by a shallow groove extending over the top of the pendant.

Bracelet: 1 specimen

A small bracelet was made by beating 11 small flat fragments of copper around a ring of rolled and sewn skin (Plate V, fig. l).

Fox vertebrae on ribs: 2 specimens

In one case three vertebrae have been strung on three ribs (Plate V, fig. m); the second specimen consists of one vertebra strung on two ribs (Plate V, fig. n). This is a common Thule trait, although it generally involves seal vertebrae and ribs.

Small antler plaques: 2 specimens

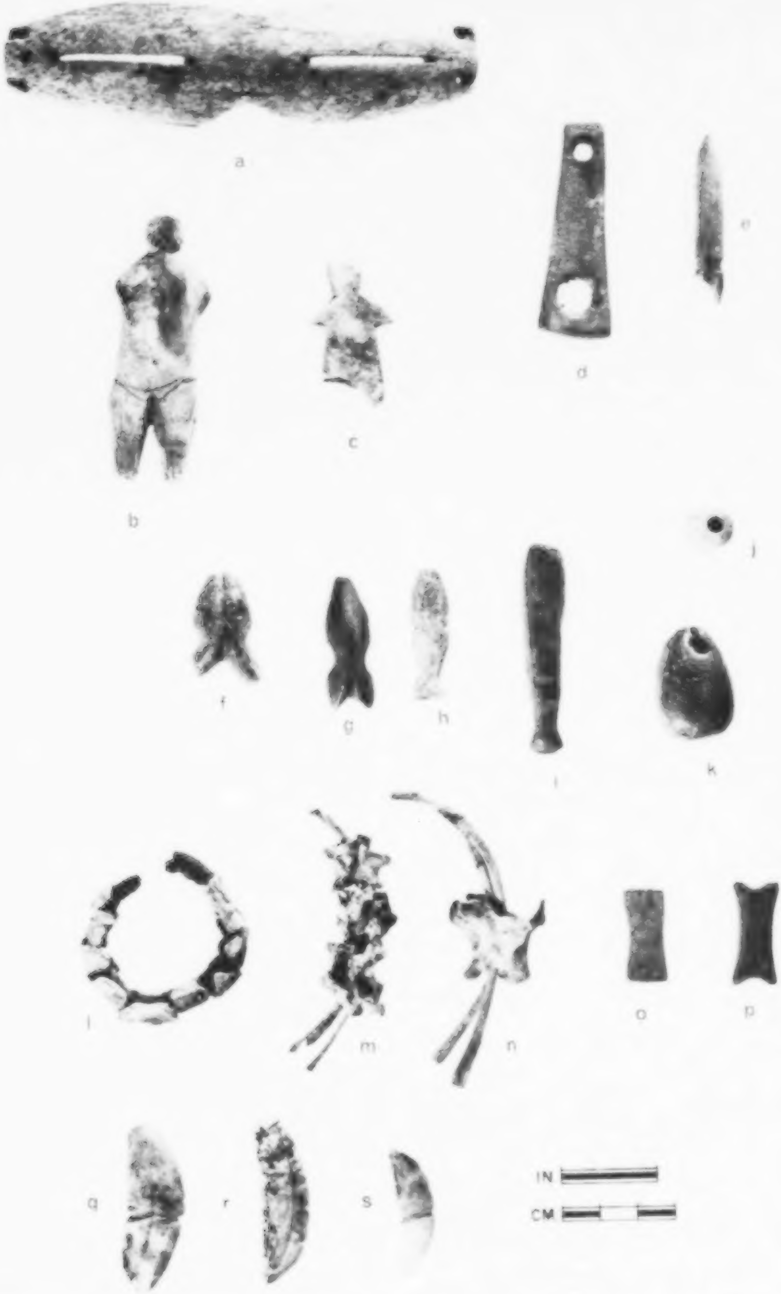
Two small flat antler plaques (Plate V, figs. o, p) are rectangular with slightly concave sides; their function is unknown.

Tooth pendants: 8 specimens

Another characteristic Thule trait is animal teeth drilled or grooved for suspension (Plate V, figs. q-s). Two fox canine teeth are drilled at the root end and one is grooved; two dog or wolf canine teeth and two bear (?) incisors are grooved.

The great majority of the artifacts described above are characteristic of Canadian Thule culture as originally defined by Mathiassen (1927*b*: 4-6); a few of the artifacts lend themselves to more specific comparisons. The prevalence of Thule 2 harpoon heads, the dominant type at early Canadian Thule sites and in the Nunagiak stage at Point Barrow (Ford 1959: Fig. 113), suggests a fairly early date for the Memorana site. The single barbed variants of Thule 2 resemble Ford's (1959: 83) Natchuk type, considered to be ancestral to Thule 2. The Memorana specimens, however, lack the vestigial side blade slots found on harpoon heads from other and probably earlier Canadian Thule sites (Taylor 1963: 458-59). The vestigial second spur and incised lines running from the lashing slots of the Thule 3 specimen are characteristic of the Tasik type considered to be ancestral to Thule 3 (Ford 1959: 82), but this specimen lacks the central constriction and raised line ornamentation found on related Sicco forms at Canadian Thule sites, which are probably earlier. The Memorana harpoon heads do, however, resemble the early Thule specimens described by Taylor (1963) in the absence of drilled lashing holes.

Darting harpoon heads with wedge-shaped tangs, such as the specimen found at Memorana, are not known from Canadian Thule culture but appear in the Nunagiak phase at Point Barrow (Ford 1959: 116) and in the Ekseavik phase on the Kobuk River (Giddings 1952: 55), dated by dendrochronology to approximately A.D. 1400. Bird dart side prongs with unilateral serrations are not known from Canadian Thule culture, and the Memorana specimens resemble a specimen found by Ford (1959: 117) at Nunagiak. The relatively large amount of pottery found at Memorana forms another link with the western Arctic, but the fact that all the sherds are undecorated suggests a more recent occupation than that of the Jackson site at Cape Parry where Barrow Curvilinear sherds occur in an occupation dated at A.D. 1015 ± 90 (I-2088) and A.D. 1350 ± 105 (I-2052; Taylor 1967: 230). The Memorana assemblage bears a generally close resemblance to that from the Cape Kellett site on Banks Island, which has received dendrochronolog-


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
IN
CM

ical maximum dates of A.D. 1466 and A.D. 1468 (Manning 1956: 24).

A single radiocarbon determination on charcoal from the Memorana site yielded a date of A.D. 130 ± 80 (Gak-1256), which is impossibly early. The occupation of the site may be estimated to have occurred at some time between A.D. 1200 and 1500.

The Bloody Falls Site

The Bloody Falls site (MkPk-3) is situated on the west bank of the Coppermine River adjacent to Bloody Falls, approximately 10 miles upstream from Coronation Gulf (Fig. 2). As Bloody Falls is the first major rapid on the Coppermine River, it is an excellent fishing site, especially during the upstream migration of Arctic char, which occurs in August and September. Whitefish, grayling, and a few trout and pike may also be caught at this locality. Except for a few caribou that winter in the lower Coppermine valley, caribou and muskox do not frequent the area at the present time. Prior to 1925, when caribou were migrating to Victoria Island across Dolphin and Union Strait, southerly migrating caribou may have been abundant in the site area during the autumn. Black bears, grizzly bears, and moose are occasionally encountered in the area during the summer months. Small sheets and lumps of native copper are found in the basaltic rocks around Bloody Falls, and more productive deposits are found in the Coppermine Mountains approximately 30 miles to the southwest of the site. Spruce driftwood is available at the site, originating from the wooded central portion of the Coppermine River; the first outlier of spruce forest occurs just above Escape Rapids, approximately 12 miles upstream from Bloody Falls.

Plate V
Memorana Site: Miscellaneous Artifacts
a. Snow goggles
b. Wooden doll
c. Stone doll
d. Dog harness trace buckle
e. Toy harpoon head
f. Whale effigy
g. Whale effigy
h. Whale effigy
i. Whale effigy
j. Cylindrical nephrite head
k. Soapstone pendant
l. Copper bracelet
m. Fox vertebrae on ribs
n. Fox vertebrae on ribs
o. Small antler plaque
p. Small antler plaque
q. Tooth pendant
r. Tooth pendant
s. Tooth pendant

The Bloody Falls site designation includes structures and refuse material scattered over a willow- and grass-covered knoll several acres in extent (Fig. 5). Excavation during the summer of 1968 was limited to a few isolated localities and did not reveal an adequate picture of the entire history of occupation. It is apparent that the site contains an Arctic Small Tool tradition component and at least one Thule component, as well as Historic period components described by explorers but not isolated archaeologically. The site has probably been used sporadically for at least 3,000 years by small groups engaged primarily in autumn fishing.

The Thule component at the site is represented by five large stone structures; two were completely excavated, and at the remaining three a few artifacts were found, indicating that they were probably occupied during the Thule period. There is no evidence to indicate whether or not these structures were occupied simultaneously. It seems appropriate to assume that occupation was probably not simultaneous, but occurred during the same general period. Preservation of organic material was poor compared to that at sites on Victoria Island. The two excavated structures yielded only 213 and 175 identifiable bone fragments respectively; 86 per cent of the bones were those of caribou, 6 per cent bird, 4 per cent muskox, 2 per cent moose, and the remainder included fox, wolf or dog, black bear, grizzly or polar bear, bearded seal, and ringed seal. As very few fish bones were preserved, the importance of fishing must be determined by the large proportion of fishing tools among the artifacts found in the structures.

Structures

Of the five structures assigned to the Thule period, one (structure 5) appears to be a large jumble of cobbles and boulders, which has been seriously disturbed and robbed of stones to build other structures. Two others (structures 2 and 4) are oval to rectangular tent rings with heavy irregular walls built of jumbled boulders and cobbles, with flat bedrock floor areas. The remaining two buildings (structures 1 and 3) are larger and more impressive although they have also been disturbed by later occupants of the site.

Structure 1 first appeared as a mass of boulders heavily overgrown with willow and moss, covering a roughly oval area measuring 23 ft north to south and 16 ft east to west. Excavation revealed that the northern end of the oval was formed by a heavy wall of boulders piled 1 to 2 ft high, surrounding a semicircular limestone slab platform approximately 10 ft wide and 4 ft deep. These roughly horizontal slabs rest on cobbles and smaller slabs, which raise the level of the platform 5 to 10 in above the floor area. The floor, lined with horizontal limestone slabs resting on sand, is roughly circular and about 5 ft in diameter. The platform seems to extend around the edges of the floor area, forming narrow side platforms or benches, which have been disturbed. Three vertically set slabs suggest the side of an entrance corridor extending south from the floor area. This entrance passage was not dug below the level of the floor, and its outer end is inclined upward, as it faces into the gentle slope of the hill on which the structure is built. On either side of the entrance passage there is a heavy and continuous jumble of cobbles, boulders, slabs, and pieces of spruce log approximately 4 in in diameter. Although this structure has been greatly disturbed, it seems to have resembled the Memorana site houses in general shape and arrangement of features. The absence of a heavy turf overburden suggests that turf was not used as a building material; the roof may have been constructed of skins over a wooden framework. This structure may represent an adaptation of the Thule winter house to late summer or autumn occupation of an inland fishing site.

Structure 3, located approximately 30 yd west of structure 1 and at the same elevation, is a large jumbled mass of boulders, slabs, and spruce logs extending continuously over an area measuring 30 ft north to south and 23 ft east to west (Fig. 6). Within this mass one can distinguish two roughly circular areas 8 to 10 ft in

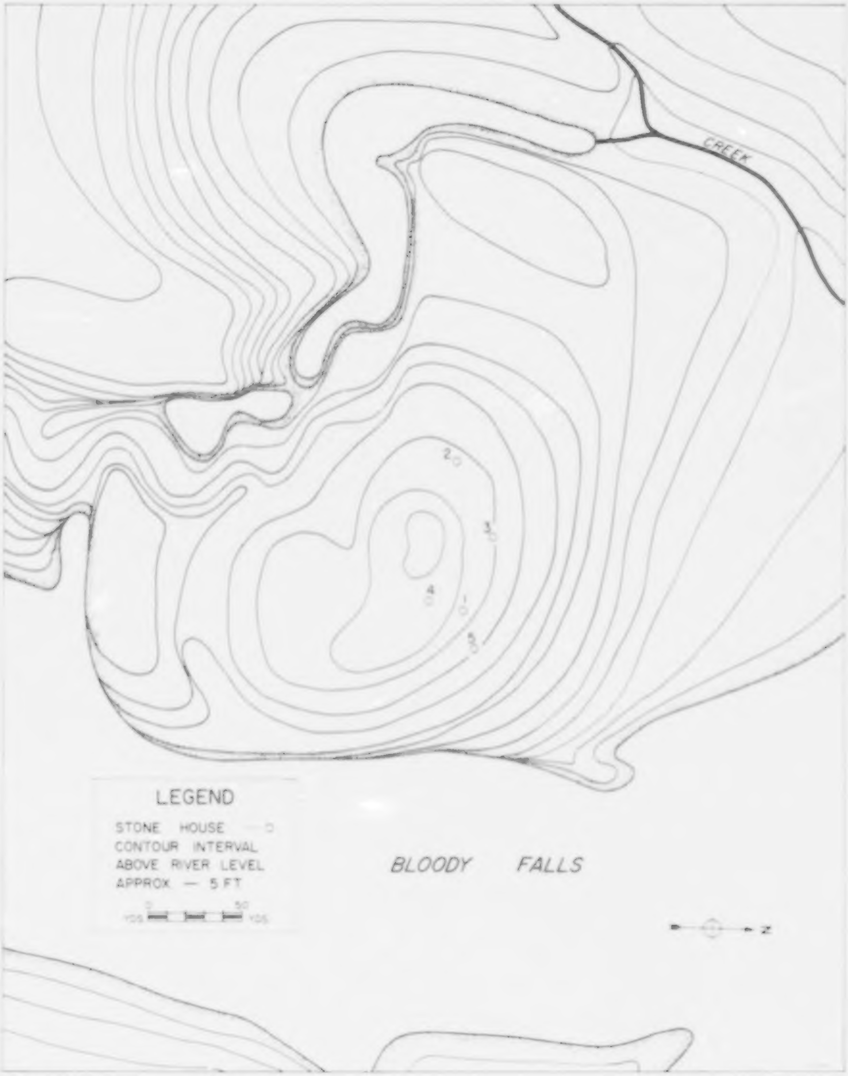

CREEK
2
3
4
1
5
LEGEND
STONE HOUSE
CONTOUR INTERVAL
ABOVE RIVER LEVEL
APPROX — 5 FT
0
50
YDS
YDS
BLOODY FALLS
N

Fig. 5. Map of Bloody Falls Site

diameter, marked by large limestone slabs, which are horizontal or inclined slightly downward toward the centre of the circular areas. The structure was probably built as a single unit; otherwise one would expect that one of the two sections would have been robbed of stones for construction of the other, which is not the case. The structure may represent a double dwelling for the accommodation of two household units. Each of the living areas would have had a slab floor surrounded by

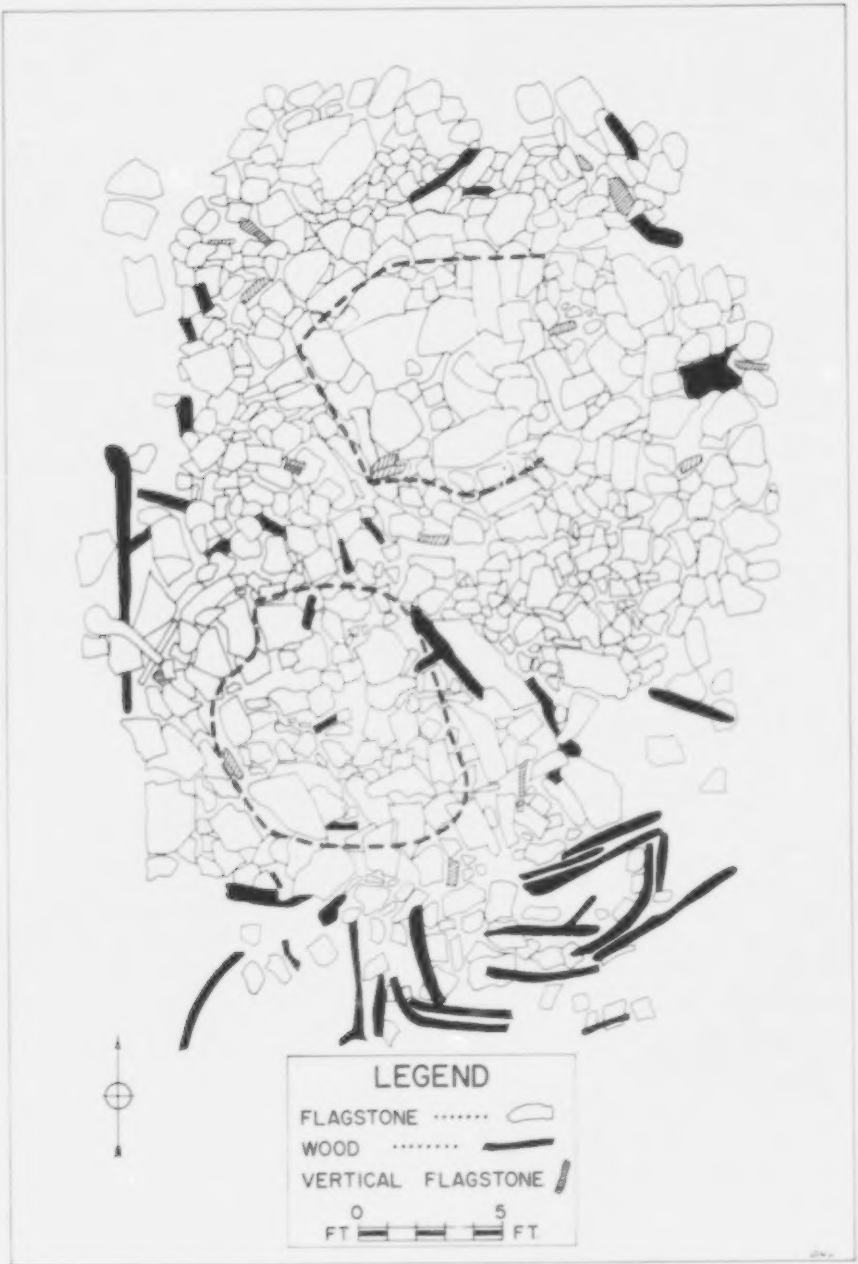

LEGEND
FLAGSTONE
WOOD
VERTICAL FLAGSTONE
0
5
FT
FT

Fig. 6 Bloody Falls Site, plan of Structure 3

a wall of piled boulders, and probably a skin roof over a frame of spruce poles. A small hearth area was found within the southern floor area, and others were located outside the main structure. This structure may represent another type of Thule dwelling adapted to a relatively sedentary summer or autumn occupation.

Artifacts

The artifact assemblage recovered from structures 1 and 3 of the Bloody Falls site is quite different from that found at the Memorana site. The functional classes found at the two sites are complementary, and the materials used are quite different; only in a few cases is a close relationship evident between the two assemblages.

A. *Sea Hunting Equipment*

Sealing harpoon head: 1 specimen

The single harpoon head (Plate VI, fig. a) is extremely fragmentary, but appears to be of Mathiassen's (1927*b*: 12) type Alc2 with an open socket, 2 pairs of drilled lashing holes, a drilled line hole, a long narrow shaft, and an end blade slot perpendicular to the direction of the line hole. The constricted shaft distal to the line hole suggests that the specimen was reworked from a Thule 2 harpoon head from which the barbs have been removed.

Harpoon ice pick (?): 1 specimen

An antler shaft 200 mm long is flat on one side, tapered distally to a sharp point, and has a proximal tang, which is scarfed on the flat face and roughened on the other, as if for attachment to the butt end of a harpoon shaft.

B. *Land Hunting Equipment*

Arrowheads: 2 specimens

One broken specimen is of antler, with circular shaft and single unilateral barb; the proximal end has deteriorated, leaving no trace of the tang (Plate VI, fig. f). The second specimen is also of antler, with lanceolate blade section, no barbs, and wedge-shaped tang roughened for insertion into the arrow shaft with which it was found; length 112 mm (Plate VI, fig. g).

Arrow shaft: 2 specimens

A portion of wooden arrow shaft approximately 350 mm long was found in association with the lanceolate arrowhead (Plate VI, fig. h). The central part of the shaft has a circular cross-section with diameter of 8 mm; two feathers are mounted against flattened but ungrooved areas on opposite sides of the shaft, the quills tied to the shaft with sinew threads. The cross-section is flattened bilaterally proximal to the feathering.

Arrow end blade: 1 specimen

A triangular slate end blade (Plate VI, fig. e) has maximum length 42 mm, basal width 17 mm, and maximum thickness 4 mm. It is smoothly ground in bilateral facets, and the central portion of the blade is thinned bilaterally toward the base.

Lance or knife end blades: 3 specimens

One end blade (Plate VI, fig. b) is

crudely chipped from basalt. The specimen is 70 mm long, has a shoulder width of 27 mm, and a maximum thickness of 8 mm; the blade section is roughly triangular with one convex edge and is tapered proximally to a wide, thin tang with a straight base. Chipped stone end blades are very rare in Canadian Thule culture but occur throughout the sequence at Point Barrow in North Alaska (Ford 1959: 167-68). A fragment of finely ground silicious stone (Plate VI, fig. c) appears to be a wide stem from an end blade of similar size to that just described. A fragment of a smaller stemmed end blade (Plate VI, fig. d) is crudely ground from red slate; the stem of this specimen must have been narrower and thinner than that described above. Stemmed end blades of ground stone are found throughout the Point Barrow sequence (Ford 1959: 167-68) and occasionally in Canadian Thule culture.

C. *Fishing Equipment*

Fish-hooks: 4 specimens

The four specimens found (Plate VI, figs. j-m), all beaten from native copper, range in length from 27 to 44 mm. The shanks are straight or bent, with square cross-sections ranging in size from 2 by 2 mm to 4 by 4 mm. The hook section is curved to form an angle of 30° to 70° with the shank; the hooks are sharply pointed and unbarbed. The proximal ends of the shanks, which are also pointed, have apparently been driven into the base of bone sinkers, as have some of the Copper Eskimo hooks described by Jenness (1946: 107). Curved copper fish-hooks have not previously been found in Thule culture assemblages; the hooks found at Bloody Falls are small, but are of the same general type as those used by historic Copper Eskimo (Jenness 1946: 106-10).

Fish spear side prong: 1 specimen

This specimen (Plate VI, fig. n) consists of a thin wooden shaft, apparently made from local willow, over 300 mm in length with circular cross-section 10 mm in diameter, expanding to 15 mm in diameter at the distal end. A copper barb has been driven through the distal end to form an angle of 40° with the shaft. The 55-mm long barb has a square cross-section with maximum dimensions 5 mm by 5 mm in the middle and tapers to a sharp point at each end.

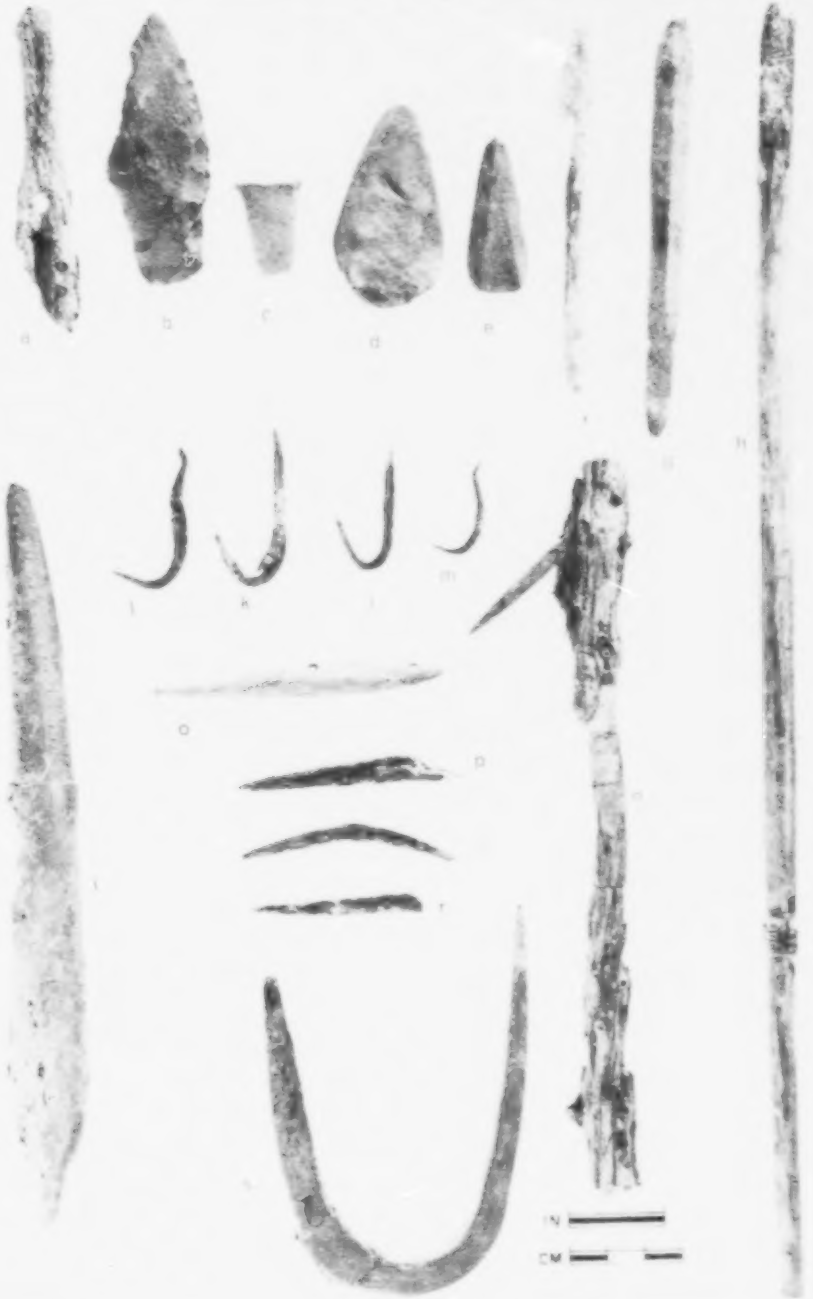
Fish spear barbs: 9 specimens

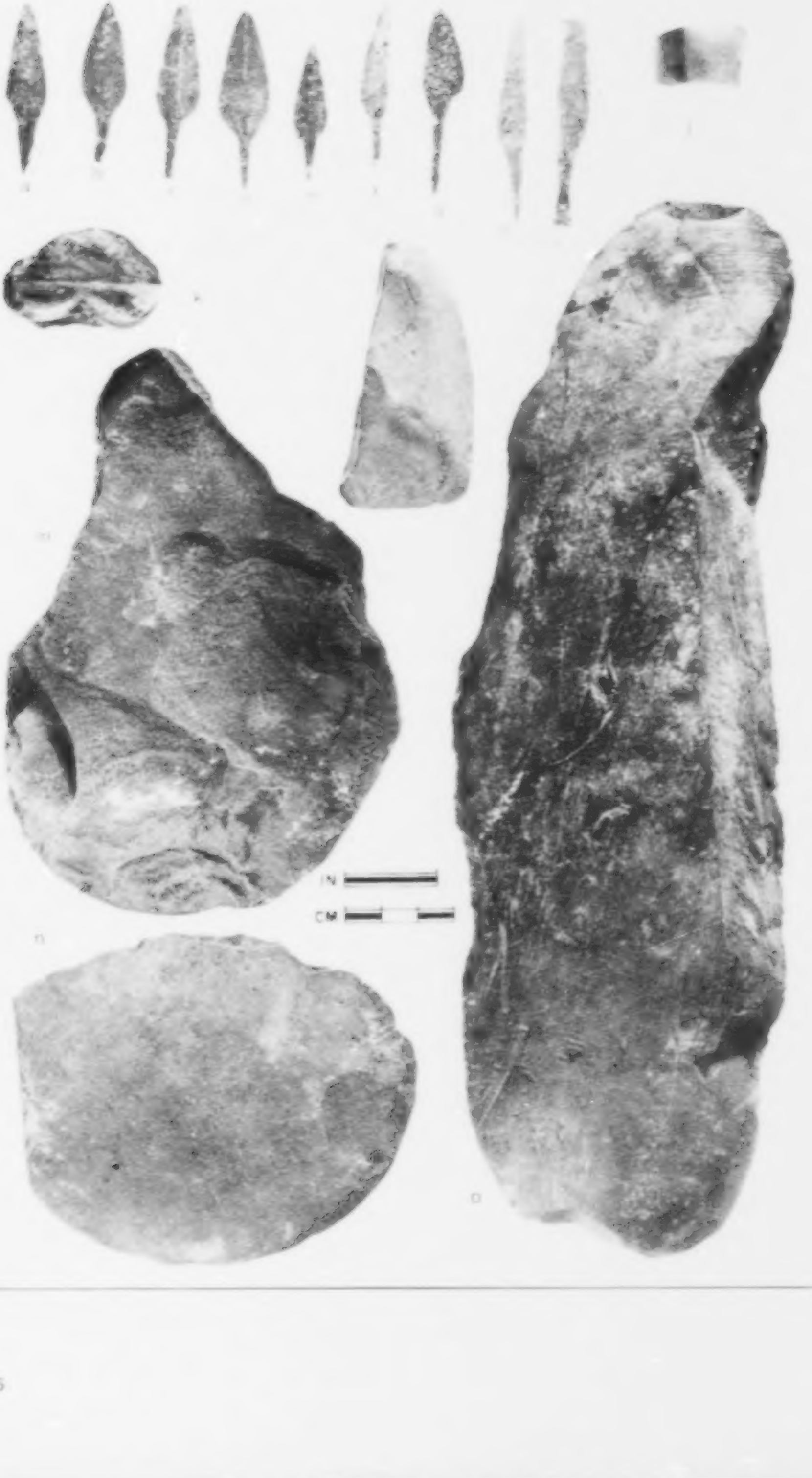
At least nine copper barbs resemble the specimen described above in having a square or rectangular cross-section and one or both ends tapered to a sharp point (Plate VI, figs. p-r).

Fish spear lure: 1 specimen

One small fish is carved from bone,

Plate VI
Bloody Falls Site: Hunting and Fishing Equipment
a. Harpoon head
b. Chipped end blade
c. Ground stem fragment
d. Ground slate end blade fragment
e. Ground slate end blade
f. Arrowhead
g. Arrowhead
h. Arrow shaft
i. Harpoon ice pick (?)
j. Copper fish-hook
k. Copper fish-hook
l. Copper fish-hook
m. Copper fish-hook
n. Fish spear side prong and copper barb
o. Fish spear lure
p. Copper fish spear barb
q. Copper fish spear barb
r. Copper fish spear barb
s. Copper gaff hook


a
b
c
d
e
f
g
h
i
j
k
l
m
o
p
q
r
s
IN
CM


IN
CM

80 mm long, with drilled eye-hole and drilled suspension hole in the middle of the back (Plate VI, fig. o). This specimen, like those found at Memorana, may have been used as a lure in spearing fish.

Fish gaff: 1 specimen

A large copper hook (Plate VI, fig. s), made from a copper bar about 200 mm long bent to a U-shape, was probably used for gaffing char at Bloody Falls. Its cross-section is rectangular, with maximum dimensions of 10 by 7 mm at the base of the "U"; one end tapers to a sharp point, whereas the other is slightly shorter and is recurved at the tip as if to retain lashing; a small sheet of thin copper is wrapped around the gaff near the base of the "U." This type of gaff may be the ancestral form of the Copper Eskimo fish rake, used with great success at Bloody Falls during the historic period (Jenness 1946: 112-13).

D. *Transportation Equipment*

Not represented at this site.

E. *Men's Tools*

Knife (and arrow?) end blades: 9 specimens

Nine small tanged end blades are beaten from native copper (Plate VII, figs. a-i). Five of these are symmetrically lanceolate, with tangs tapering to sharp points and lengths ranging from 38 to 50 mm. The remaining four specimens are asymmetric, with one edge relatively straight and the other convex; three of them have sharp points, and one has a flat distal end. These end blades were probably mounted as small whittling knives and burins, or perhaps used on arrows.

Plate VII
Bloody Falls Site: Men's Tools
a Copper end blade
b Copper end blade
c Copper end blade
d Copper end blade
e Copper end blade
f Copper end blade
g Copper end blade
h Copper end blade
i Copper end blade
j Hematite rubbing stone
k Bow drill socket
l Adze blade fragment
m Large stone scraper
n Spall scraper
o Stone pick

Bow drill sockets: 3 specimens

Three caribou astragali show use as bow drill sockets. Two have been thinned bilaterally to provide a better grip for the teeth of the user (Plate VII, fig. k) but show no other modification.

Adze blade: 1 specimen

One small broken adze blade (Plate VII, fig. l) is crudely ground from red slate. The specimen is roughly triangular in shape, with rounded butt, straight cutting edge ground bilaterally in narrow facets, and rather convex lateral edge; maximum length is 72 mm, width of cutting edge is approximately 35 mm, maximum thickness is 13 mm.

Stone picks: 2 specimens

Two large oblong chunks of basalt, probably split from the edges of boulders, are thinned and rounded at one narrow end and show heavy wear polish on this edge (Plate VII, fig. o). The larger specimen measures 290 by 80 by 30 mm, the smaller, 210 by 90 by 20 mm. Similar specimens were found throughout the Kobuk River sequence, and Giddings (1952: 79) considers these to be digging tools of either a local or a generalized inland type.

Large stone scrapers: 9 specimens

These specimens are of several forms and probably served different purposes. One spall from an igneous cobble (Plate VII, fig. n) shows heavy wear around the curved and rather blunt distal edge. One larger spall from an igneous boulder shows lighter wear on the convex surface near a curved edge. The opposite flat surface is heavily stained with red ochre. A large quartzite spall has light wear on the convex surface, and the sharp curved edge is lightly trimmed. An irregular chunk of basalt has heavy wear or grinding along two sharp straight edges. A chunk of sedimentary rock is roughly trimmed to a disk shape, 115 mm in diameter and 15 mm thick; the edges show no wear. Three other flat pieces of sedimentary rock and one chunk of basalt are trimmed to a curved edge, which is blunted and has heavy wear polish (Plate VII, fig. m). These tools may have been used in working wood or in softening skins; they are not known from other Arctic coast Eskimo sites.

Whetstones: 34 specimens

Two fragments are from large whetstones, oblong in shape with rectangular cross-sections and grinding on opposing thin edges. Thirty-two small pebbles and flakes of slate, shale, schist, basalt, and jadeite exhibit varying amounts of grinding and polishing and show no regularity in shape or form. Perhaps some of these small whetstones were used in the manufacture and shaping of copper tools.

Hematite rubbing stone: 1 specimen

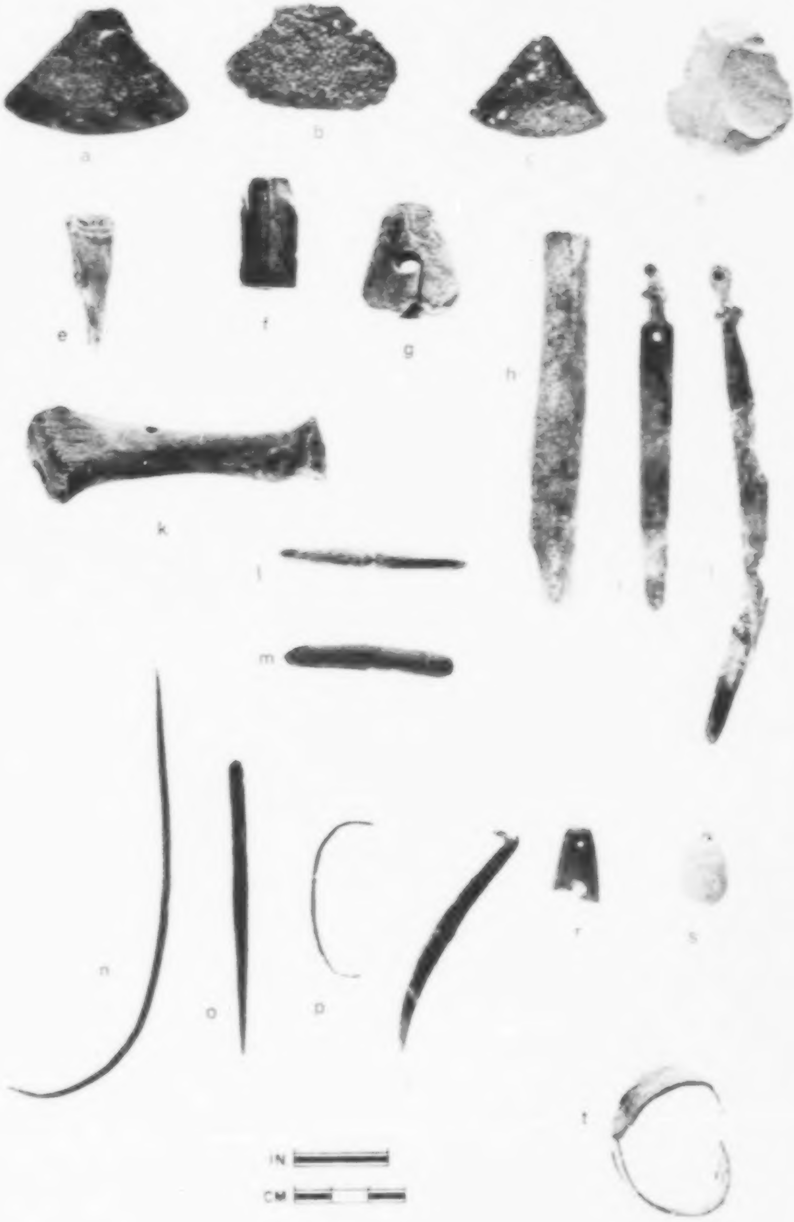
A small nodule of hematite (Plate VII, fig. j) is rubbed to shape in a series of flat facets. This small stone has probably been used for colouring artifacts or clothing.

F. *Women's Tools and Household Equipment*

Women's knife blades: 3 specimens

Three small triangular copper blades apparently were used with a small type of women's knife (Plate VIII, figs. a-c). The smoothly convex cutting edge ranges in length from 38 to 50 mm. The proximal edge of one specimen is tapered to a point and contains a rivet hole; the proximal ends of the other specimens are squared to fit into a 15- to 20-mm long slot in the handle. These specimens do not show the characteristic features of historic copper women's knife blades but were apparently used with a handle that had a narrow "tang" or intermediate section.

Plate VIII
Bloody Falls Site: Women's Tools and Miscellaneous Artifacts
a. Women's knife blade, copper
b. Women's knife blade, copper
c. Women's knife blade, copper
d. End scraper
e. Lamp trimmer, asbestos
f. Toy needle case
g. Winged needle case fragment
h. Needle case
i. Marrow spatula
j. Marrow spatula
k. Seal radius *ajagaq*
l. Small antler toggle
m. Small wooden toggle
n. Copper artifact, unidentified
o. Copper artifact, unidentified
p. Copper artifact, unidentified
q. Copper artifact, unidentified
r. Stone pendant fragment
s. Flat stone pendant
t. Copper bracelet (?)


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
r
s
t
IN
CM

Lamp trimmer: 1 specimen

A small chunk of asbestos (Plate VIII, fig. e) is 40 mm long and has a rectangular cross-section tapered to a point at one end. It may have been used as a lamp trimmer.

End scraper: 1 specimen

The single stone end scraper is made of a flake of basalt (Plate VIII, fig. d). The scraping edge is steep, smoothly convex, and 35 mm wide. The smoothly rounded butt is separated from the scraping edge by small bilateral shoulders; maximum length is 37 mm, maximum width is 35 mm, maximum thickness is 5 mm.

Needle cases: 3 specimens

One specimen (Plate VIII, fig. h) is simply a straight piece of hollow bird bone 10 mm in diameter; one end has been cut flat, and the other end is missing. The second fragmentary specimen is an ivory object (Plate VIII, fig. g), which appears to have been cut from the end of a large needle case of the "winged" type. The central hole is drilled, 8 mm in diameter; the outer cross-section is oval with maximum dimensions of 26 by 16 mm just above the "wings," which have been cut off. The narrow end is ornamented with two marginal lines and a ring of "Y" figures, some of which have small strokes added as arms to turn them into stick-man figures; the "wings" are decorated with two parallel hatched lines. A lateral hole has been drilled through the shorter axis, possibly so that the fragment may be used as a pendant. The third specimen (Plate VIII, fig. f) is a small wooden model or toy representing a "winged" needle case. It is 30 mm long and has a drilled central hole; the ends and wings are ornamented with double marginal lines.

Marrow spatulae: 2 specimens

Two deteriorated specimens are narrow rods of antler, 140 mm and 95 mm in length, with spatulate distal ends and expanded proximal heads, narrow necks, and one pair of bilateral shoulders (Plate VIII, figs. i, j). The proximal ends have suspension holes, probably for attachment of the specimens to the needle case as described for similar historic specimens (Jenness 1946: 95).

Soapstone vessels: 7 specimens

One specimen consists of a little over half of a rectangular soapstone pot. The vessel is well made, with slightly convex walls, square corners, and a flat base; length is 210 mm, maximum width is 130 mm, depth is 75 mm. The flat rim is decorated with two parallel incised lines on the top of the rim and a single incised line on the exterior surface of the two longer sides just below the rim. A rectangular lug 20 mm long and 5 mm wide is found on the exterior of each shorter side, 30 to 35 mm below the rim. Each corner bears a suspension hole drilled from the top of the rim to the exterior of the longer sides. The walls are 9 to 14 mm thick, and the bottom is 5 mm thick. Fragments of at least six other vessels were found. One is a rectangular pot with two incised lines on the top of the rim and two incised lines just below the rim; two are rectangular pots with plain flat rims; one appears to be a lamp with a flat bottom and a curved rear wall; the two others are too fragmentary to make any reconstruction of form.

Pottery vessels: 6 specimens

The sherds found represent at least six vessels, two of which may be partially reconstructed. Paste is black in the interior of the sherds and grades from black to grey and even buff at the exterior; it is heavily tempered with sand or crushed rock. Most fragments are less than 1 mm in diameter, but a few pieces are up to 4 mm in diameter. Texture is fairly coarse and laminated but is harder and more cohesive than that of the Memorana site pottery. Thickness ranges from 7 to 17 mm with average thickness of 10 mm. Surfaces have been smoothed by being grass-wiped but are pitted and sometimes lumpy; the exterior surfaces of vessels are heavily coated with soot. None of the sherds is decorated. One vessel is a large oval or subrectangular (bathtub-shaped) pot with convex vertical walls and a flat or slightly convex base, approximately 150 mm deep, probably 250 to 350 mm long and 150 to 200 mm wide; the lip is slightly rounded, and the exterior of the rim is thickened for 15 mm below the lip. Another vessel seems to be globular in form, with estimated rim diameter of 300 mm and estimated height of 300 to 400 mm; the lip is rounded, and the exterior of the rim is thickened for 10 mm below the lip. The rim of a third vessel is not thickened but has a rounded lip. This pottery fits MacNeish's (1956: 52-53) definition of Thule grit-tempered ware.

G. *Miscellaneous*

Ajagaq: 1 specimen

A ringed seal radius (Plate VII, fig. k) has had both epiphyses removed, a hole drilled into either end, and a small suspension hole drilled near the middle of the ventral edge. Various types of simple bone *ajagaq* are common in Thule assemblages.

Stone pendants: 2 specimens

One fragmentary stone pendant (Plate VIII, fig. r) is ground from red slate; it has a small drilled suspension hole and groove over the top of the pendant, similar to that on the pendant found at Memorana. The second (Plate VIII, fig. s) is a small flat pendant ground from a green silicious stone, with a drilled suspension hole and serrated edges.

Beads: 11 specimens

Ten rather crude small cylindrical beads with drilled suspension holes are made from brown amber. A small disk bead ground from black slate was associated with nine of the amber beads.

Small toggles: 2 specimens

One small antler toggle (Plate VIII, fig. l) is 52 mm long, plano-convex in cross-section, and has a narrow groove around the centre. The second specimen (Plate VIII, fig. m) is of wood, 46 mm long, with circular cross-section, rounded ends, and narrow central groove. The function of these toggles is unknown.

Bracelet(?): 1 specimen

A thin band of native copper 15 mm wide has been curved into an open circle 30 mm in diameter (Plate VIII, fig. t). This may be a shaft mounting or small bracelet.

Unidentified copper artifacts: 4 specimens.

A thin bar of copper 120 mm in length is tapered to a sharp point at either end and curved into a shallow hook (Plate VIII, fig. n). A thin bodkin-like pin 80 mm long is sharpened at one end, and the other end is flattened (Plate VIII, fig. o). A piece of thin copper wire is sharpened at either end and curved to a shallow U-shape (Plate VIII, fig. p). A curved copper pin or barb (Plate VIII, fig. q) is 68 mm long; one end is worked to a sharp point, and the tip of the other end is bent to form a right angle with the main shaft. The functions of these artifacts are not known.

This site shows an interesting combination of traits considered to be indicative of various time periods. On the one hand, the pottery appears to be of an earlier variety than that found at Memorana: temper is much finer, paste is somewhat harder and more cohesive, vessel walls are thinner, and lips are thickened. Thickened rims appear only in the Birnirk phase at Point Barrow (Ford 1959: 199-204) and disappear after the Ekseavik phase on the Kobuk River (Giddings 1952: 94-95). The chipped end blade with a wide thin stem resembles specimens from Birnirk, Nunagiak, and Ekseavik (Ford 1959: 135-37; Giddings 1952: Figs. 29-30) more closely than the later forms on which tangs tend to be narrower and thicker. The chipped end scraper with shoulders is similar to forms from Nunagiak (Ford 1959: 194) and Ekseavik (Giddings 1952: 71). These traits would tend to link the Bloody Falls assemblage to western Arctic sites of the period preceding A.D. 1500.

Other traits are characteristic of relatively early Canadian Thule sites: the flat stone pendant with serrated edge, large stemmed ground stone end blade, amber beads, soapstone pot with two incised lines on the rim, are all similar to specimens found at Naujan (Mathiassen 1927*a*: Plate 31, fig. 5; Plate 19, fig. 6; pp. 72, 65). The "winged" needle case and decoration of opposed hatched lines are characteristic of generalized Canadian Thule culture (Mathiassen 1927*b*: 92, 122). The reworked Thule 2 harpoon head is a standard Thule form, but the drilled lashing holes suggest a later date than Memorana, where all harpoon heads had lashing slots or beds.

Several other elements are not characteristic of Thule culture as it is now known: rectangular soapstone pot with squared corners, copper blade for women's knife with narrow or T-shapped handle, copper fish-hook, copper barb for fish spear, gaff hook, tanged copper end blade, and decorated marrow spatula with suspension hole. All these traits trend toward historic Copper Eskimo forms. On the whole, one is probably safe in placing this site in the Thule period, while recognizing that a distinctive regional adaptation had been completed by the time the site was occupied. The occupation of the site probably occurred at some time between A.D. 1200 and 1600.

The Thule Period in the Copper Eskimo Area

Definition

The Thule period may be defined most usefully for present purposes, and perhaps most adequately, considering the paucity of absolute dates available, in terms of cultural characteristics. Sites are assigned to the Thule period on the basis of the following characteristics: (1) the presence of semisubterranean winter dwellings with heavy interior construction of stone or wood such as those described from the Memorana site, or heavy stone houses and tent rings similar to those found at Bloody Falls; (2) the resemblance of a large proportion of the artifact assemblage to Canadian Thule culture as it has been defined from the eastern Arctic (Mathiassen 1927*b*) or to the Nunagiak, Ekseavik and Kotzebue assemblages from North Alaska (Ford 1959: Giddings 1952). The Thule period may then be defined as the period of time during which the above characteristics were present in the area.

The chronological definition of the Thule period in the Copper Eskimo area must be based on a very small number of absolute dates. The earliest known Thule components, judging from harpoon head styles, are represented by small collections from the vicinities of Inman River and Lady Franklin Point (Taylor 1963: 458-59); neither of these components is dated. A somewhat later phase of Thule culture, represented by the Jackson site at Cape Parry, is radiocarbon dated at A.D. 1015 ± 90 (I-2088) and A.D. 1350 ± 105 (I-2052; Taylor 1967: 230). Another relatively early Thule assemblage, from the Pembroke site in southeastern Victoria Island, is radiocarbon dated at A.D. 1245 ± 120 (I-2059; Taylor 1967: 230). A middle-Thule assemblage from Cape Kellett on Banks Island has received dendrochronological dates of A.D. 1466 and A.D. 1468 (Manning 1956: 24). The assemblages from the Lady Franklin Point site in southwestern Victoria Island (Taylor n.d.) and the Bloody Falls site suggest occupation by a later phase of Thule culture than that represented at Cape Kellett. One may suggest provisional outside dates of A.D. 1000 and A.D. 1600 for the Thule period in the Copper Eskimo area.

Known Sites

The known sites that definitely fall within the Thule period are those previously discussed: the Cape Kellett site in western Banks Island, the Vaughn and Jackson sites at Cape Parry, the Memorana site in western Victoria Island, the Pembroke site in southeastern Victoria Island, the Lady Franklin Point site in southwestern Victoria Island, and the Bloody Falls site on the Coppermine River. Other sites have not received absolute dates and have not been extensively excavated but fall within the cultural definition of the Thule period. These are the Cape Cardwell and Nelson River sites in southeastern Banks Island (Manning 1956: 26), the Clare and Bell sites in southeastern Victoria Island, and the sites at Lady Franklin Point and Inman River on the mainland coast west of Dolphin and Union Strait that produced collections of Thule artifacts (Taylor 1963: 458-59). At Berkeley Point, north of Minto Inlet in western Victoria Island, a Thule house was seen by Taylor and the author during aerial survey in 1965; a local Eskimo excavated this house and identified the artifacts found as similar to those found at the Memorana site, including Thule 2 harpoon heads.

Wood and sod houses, which were probably occupied during the Thule period, have been noted at several localities by travellers in the area: two villages of two and eight houses near Sachs Harbour (Manning 1956:

26); six or seven houses at Cape Lyon just east of Cape Parry (Franklin 1828: 241; Jenness 1922: 56); three houses at Pearce Point (Stefansson 1919: 225); seven houses at House Point and eight at Tysoe Point (Taylor n.d.); six houses at DeWitt Clinton Point (Jenness 1922: 56; Stefansson 1919: 226); one house near the mouth of Croker River (Stefansson 1919: 18, 303-304); 14 houses at the mouth of Inman River (Jenness 1922: 56); one house on an island off Locker Point (Jenness 1922: 56); three houses on Bell Island and two houses at the bottom of Lady Richardson Bay in southwestern Victoria Island (Jenness 1922: 50-51); two houses on an island in the Jameson Archipelago and one in the Duke of York Archipelago (Jenness 1922: 246). Some of the many ruins noted by Thomas Simpson (1843: 378) along the south shore of Coronation Gulf between Coppermine River and Kent Peninsula may belong to this period; Captain Joseph Bernard reported that one such site, located a few miles east of Tree River, contained three wood and sod houses (Jenness 1922: 246). The locations of the sites and villages listed above are indicated on Fig. 2 (*see* p. 21).

Culture of the Thule Period Population

The material culture of the Thule period occupants of the Memorana and Bloody Falls sites has been described above. These artifact assemblages are typical of the smaller collections made from other excavated sites in the area and closely resemble those of contemporaneous populations in the eastern and western Arctic. Most of the Thule period artifacts described above are functionally similar or identical to artifacts used by historic Eskimo, to the extent that Thule period artifacts can be reliably classed into narrow functional categories. The extension of this analogical reasoning to non-material culture allows the reconstruction of certain elements of subsistence techniques, patterns of seasonal activity, and associated elements of the social organization of the Thule period population.

Winter activities are most adequately known, for it was during this season that the large wood and sod houses were occupied. The average number of houses per site in the 26 Thule period winter villages for which house counts are available is approximately 4.5; this figure is extremely close to the average of 4.6 dwellings per village that Dunning (1966: 218) reported for 48 historic Central Eskimo occupation units. The similarity of these figures suggests the action of similar ecological and socio-economic factors on both sets of populations. Dunning suggests that settlements of this size represent domestic groups that are the minimal social units economically viable (for at least part of each year) in a central Arctic hunting context, and that demographic factors related to this situation foster a proliferation of these minimal units for economic efficiency or even survival (Dunning 1966: 219-21). Damas (1969*a*: 122) notes the existence of a similar social unit, which he terms the hunting group, among historic Central Eskimo populations and suggests that (1969*b*) the form of the group is conditioned both by ecological and historical factors.

The archaeological evidence suggests that the typical winter occupation unit of the Thule period population was a group of perhaps two to ten nuclear families. Groups of this size may have been necessitated by ecological and demographic circumstances. Distributional evidence from historic Central Eskimo (Damas 1969*b*) suggests that if the Thule population was ancestral to the historic populations, then the Thule hunting groups were probably organized as viri-oriented extended families; other elements of social organization related to the maintenance of the hunting group were probably kin exogamy, child betrothal, spouse exchange and adoption (Damas 1969*b*: 53, 59). All the Thule period villages known from this area are much smaller than the large permanent communities occupied by the historic coastal Eskimo of North Alaska and the Mackenzie area (Spencer 1959: 14-18; Stefansson 1919: 23-25), the groups to which Thule culture is most frequently compared (e.g., Spencer 1959: 448). Institutions such as the formalized hunting crew and men's house complexes of the North Alaskan Eskimo would appear to have been unnecessary and impracticable in the small Thule villages of the central Arctic. Spencer (1959: 449) may be correct in tracing these complexes to western Alaska rather than to the Thule population.

The artifacts and bone refuse recovered from the Memorana site suggest that the winter occupants of this site were engaged largely in sealing, probably from *kayaks* in open water or from the floe edge and at tidal cracks; sealing may have been supplemented by some winter hunting of caribou and other land animals. Bone refuse from the Vaughn and Jackson sites at Cape Parry suggests a similar winter subsistence pattern (Taylor n.d.). At the Lady Franklin Point and Bell sites, the structures of which suggest winter occupations, the bone refuse reflects a much heavier dependence on caribou, practically to the exclusion of all other food sources (Taylor 1966: 116). Since both these sites are situated at good hunting localities on the main autumn caribou migration routes, it seems likely that although some winter sealing and land hunting was undertaken, winter subsistence was based largely on caribou, which were killed during the autumn migration and stored for winter use.

None of the excavated Thule period sites in this area has yielded the abundance of equipment relating to dog-sledding that is characteristic of eastern Arctic Thule sites. This fact, taken in conjunction with the permanence of winter houses, suggests that winter life was rather sedentary, oriented towards the coast rather than to the sea ice, and that large winter gatherings, such as occurred among historic Eskimo, were not held.

No Thule period sites representing spring and summer occupations have been identified. The presence of a few pieces of whale bone, baleen, and artifacts related to whaling (e.g., the *umiak* harpoon rest found at Memorana) at most Thule winter sites suggests that whaling was one of the summer activities engaged in, at least by groups to the west of Dolphin and Union Strait. The scarcity of whale bone and baleen at all sites east of Cape Parry, however, suggests that although the techniques of whaling may have been known, this activity was not economically important. As whaling is the only subsistence activity that could have supported large concentrations of population during the summer months, as it did in

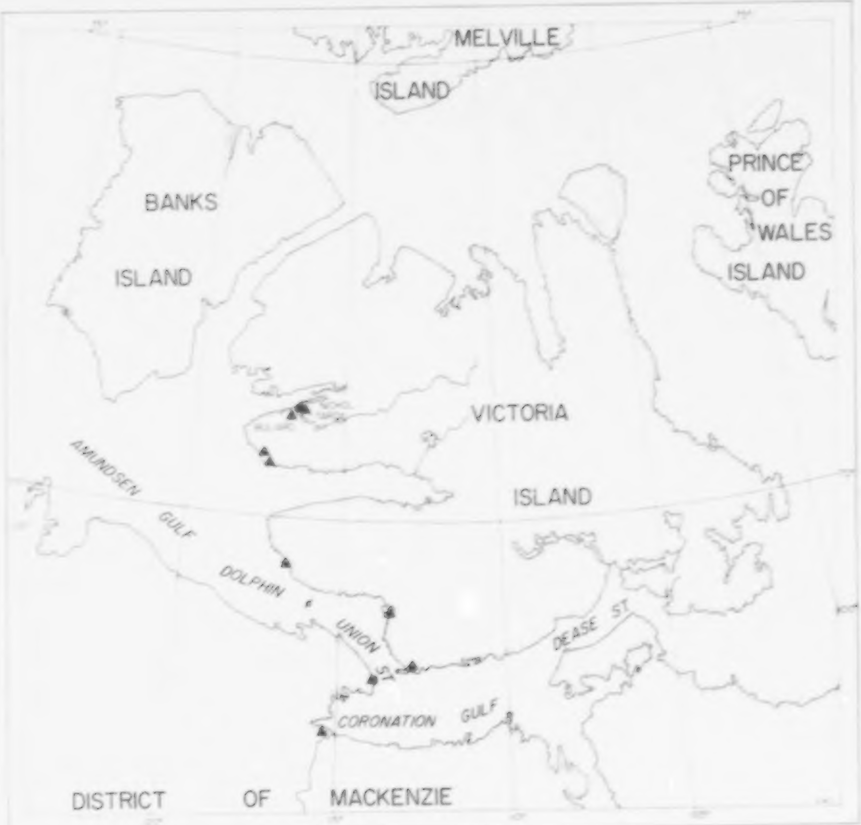

MELVILLE
ISLAND
BANKS
ISLAND
PRINCE
OF
WALES
ISLAND
VICTORIA
ISLAND
AMUNDSEN
GULF
DOLPHIN
UNION
ST
DEASE ST
CORONATION GULF
DISTRICT OF MACKENZIE

Fig. 7 Locations of Intermediate Interval sites

North Alaska and the Mackenzie area, one may infer that the hunting group of a few families was again the basic social unit during this season. Summer subsistence activities probably included coastal sealing from *kayaks*, inland caribou hunting, and lake and river fishing.

The Bloody Falls site appears to represent an autumn occupation established for the purpose of hunting southward-migrating caribou and fishing for char. Heavy stone tent rings and stone huts in the vicinity of the Lady Franklin Point site (Taylor 1964: 49), the Bell site (Taylor 1964: 53), and at the Clare and Pembroke sites (Taylor 1964, n.d.) were probably occupied during the autumn season, primarily as caribou hunting stations. Taylor (1965: 16) reported finding a Thule arrowhead in association with an extensive caribou-drive system on the north side of Ekalluk River opposite the Bell site; this suggests that the autumn caribou hunt was conducted in a similar manner to that of the historic Copper Eskimo of Victoria Island (Jenness 1922: 149). The autumn caribou hunt provided prime skins for winter clothing. Caribou meat and char were probably stored for consumption during the early part of the winter, as was the case during the Historic period, while in some localities (e.g. Lady Franklin Point) autumn-killed caribou may have provided food for most of the winter season.

The information presently available permits only speculation on the social organization of the Thule population at any level above the hunting group. On distributional evidence, Damas (1969*b*: 49, 59) suggests that the ancestors of the historic Central Eskimo were clustered into maximal groups (bands), which were largely or entirely composed of persons linked by primary kin ties with a distinct viri-orientation. There is not enough archaeological evidence to determine whether this hypothesis relates to the Thule population. The small size of Thule period sites and the relatively thin cultural deposits found at most excavated sites suggest that the total size of the Thule period population of the area was not much larger, and was perhaps smaller, than that of the historic Copper Eskimo. Certain elements of the material culture recovered from most excavated sites in this area appear to characterize the Thule period population of the area as a group distinct from contemporaneous populations to the west in North Alaska (Ford 1959) and to the east in the Gulf of Boothia, Foxe Basin, Lancaster Sound area (Mathiassen 1927; Collins 1952; Van Stone 1962). These elements are the predominance of Thule 2 harpoon heads with lashing slots, the rather stubby unibarbed arrowheads, the use of wood and copper to a greater extent than in other areas, the crude pottery, the wooden house supports, and a subsistence pattern adapted to the absence of large sea mammals through most of the area occupied. Further archaeological work may test the hypothesis that the Thule period population of the area between Cape Parry and Queen Maud Gulf formed a distinct "tribe" (Damas 1969*a*: 129), as distinct from its neighbouring tribes as were the historic Copper Eskimo from the Mackenzie Eskimo to the west and the Netsilik to the east.

The Intermediate Interval

Several sites in the Copper Eskimo area fit neither the pattern of typical Thule culture, as outlined above, nor that of historic Copper Eskimo culture. The most characteristic feature of all these sites is the almost uncanny scarcity of artifacts and food bone refuse, a feature that obstructs both chronological and cultural assignment. Several bits of evidence hint at a chronological placement of some of these sites between the Thule and Historic periods; these sites are therefore assigned to an Intermediate interval, the term "interval" being used in order to emphasize the loose chronological definition relative to that of the Thule and the Historic periods. Because of the paucity of artifacts, sites are assigned to this interval on the basis of structural features: the Intermediate interval may be defined as that period of time during which semisubterranean houses without interior construction and heavy tent rings with stone platform edge were in use. No absolute dates are assigned to this interval; the lower end certainly overlaps the time range of the Thule period as previously defined (A.D. 1000-1600), while the upper end likely impinges on the Historic period, which began in 1771. A rather clumsy analytic category of this sort is compatible with, and indeed necessary to, the hypothesis that culture change would have to take place at different rates and at different times over the Copper Eskimo area of some 200,000 square miles.

Three of the sites that fall into this category will be described briefly. These sites (Nichol, Buliard, Tardy) are located near the mouth of Kuujjua River, a large stream that flows into the south shore of Minto Inlet in western Victoria Island (Fig. 7). The Kuujjua River has excellent spring and autumn runs of Arctic char, and one may hunt seals in the river mouth during the season of open water, when they enter the broad lower course of the river to hunt fish. Winter sealing through the ice of Minto Inlet is currently quite productive, and a few caribou winter in the hills, which extend near the coast in this area. Whales and polar bear are occasionally seen in the area.

The Nichol Site

The Nichol site (OhPo-6) includes three semisubterranean structures located 200 yards east of Kuujjua River and approximately the same distance inland from Minto Inlet (Fig. 8). Two of the structures were excavated, yielding 20 identifiable artifacts, 670 identifiable fragments of animal bone, and two human bones. Ringed seal is represented by 95 per cent of the bone refuse; the remainder represents caribou, muskox, bird, and fish. Two human bones, the mandible and humerus of a child, were found within the living area of one of the houses.

Structures

The larger of the two structures excavated had been greatly disturbed, apparently by children excavating for artifacts approximately 30 years ago. This feature probably represents the remains of at least two superimposed houses. The most plausible reconstruction of the structures suggests a subrectangular main chamber measuring approximately 10 ft square and 18 in deep, dug into the top of a small gravel knoll. An entrance passage approximately 10 ft long, 3 ft wide, and 18 in deep leads down the side of the knoll and ends in a 5-foot square antechamber. The main chamber and the entrance are floored with the gravelly soil into which they have been dug, and a few fragments of decayed wooden sticks suggest that the roof had been supported by wooden poles.

The second structure to be excavated is somewhat smaller, with a subrectangular main chamber measuring approximately 8 by 9 ft, and a sloping entrance passage similar to that of the first structure. Again there are no recognizable platform or floor areas and no stone construction in the interior. Several fragments of decayed wood lying in a roughly radial pattern near the edges of the main chamber suggest wooden roof supports arranged in a conical fashion (Fig. 9).

Structures of this type are not found on any of the excavated sites of the Thule period in this area. The scarcity of artifacts and food remains suggests that they were not occupied for an entire winter season. The general lightness of construction, the absence of a raised sleeping platform, and the absence of a heavy turf overburden (which suggests a light

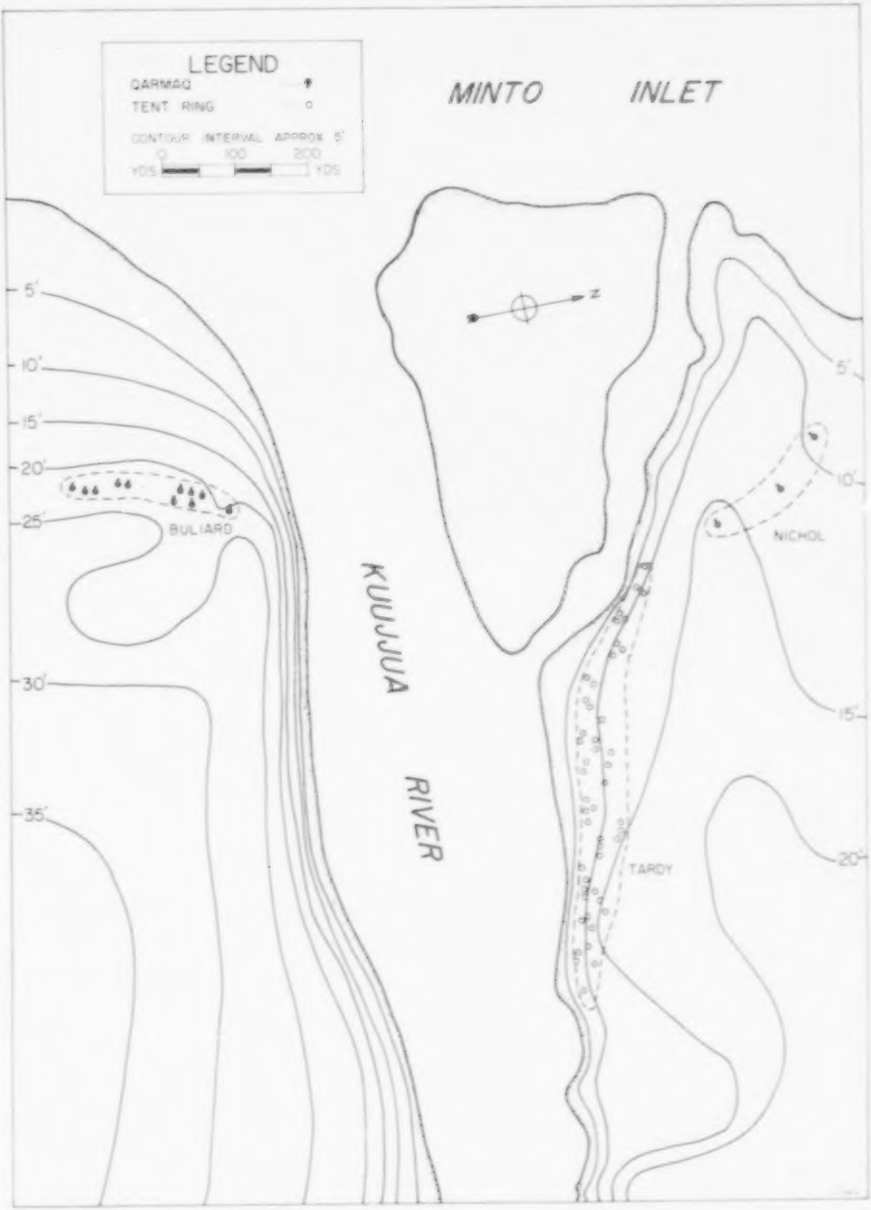

LEGEND
QARMAQ
TENT RING
CONTOUR INTERVAL APPROX 5'
0
100
200
YDS
YDS
MINTO INLET
N
5'
10'
15'
20'
25'
30'
35'
BULIARD
KUUJJUA RIVER
NICHOL
TARDY
5'
10'
15'
20'

Fig. 8. Map of Kuujjua River sites

roofing of skins over a framework of poles) imply the same conclusion. On the other hand, the presence of inclined entrance passages, which must have been roofed with snow or ice blocks in order to have been

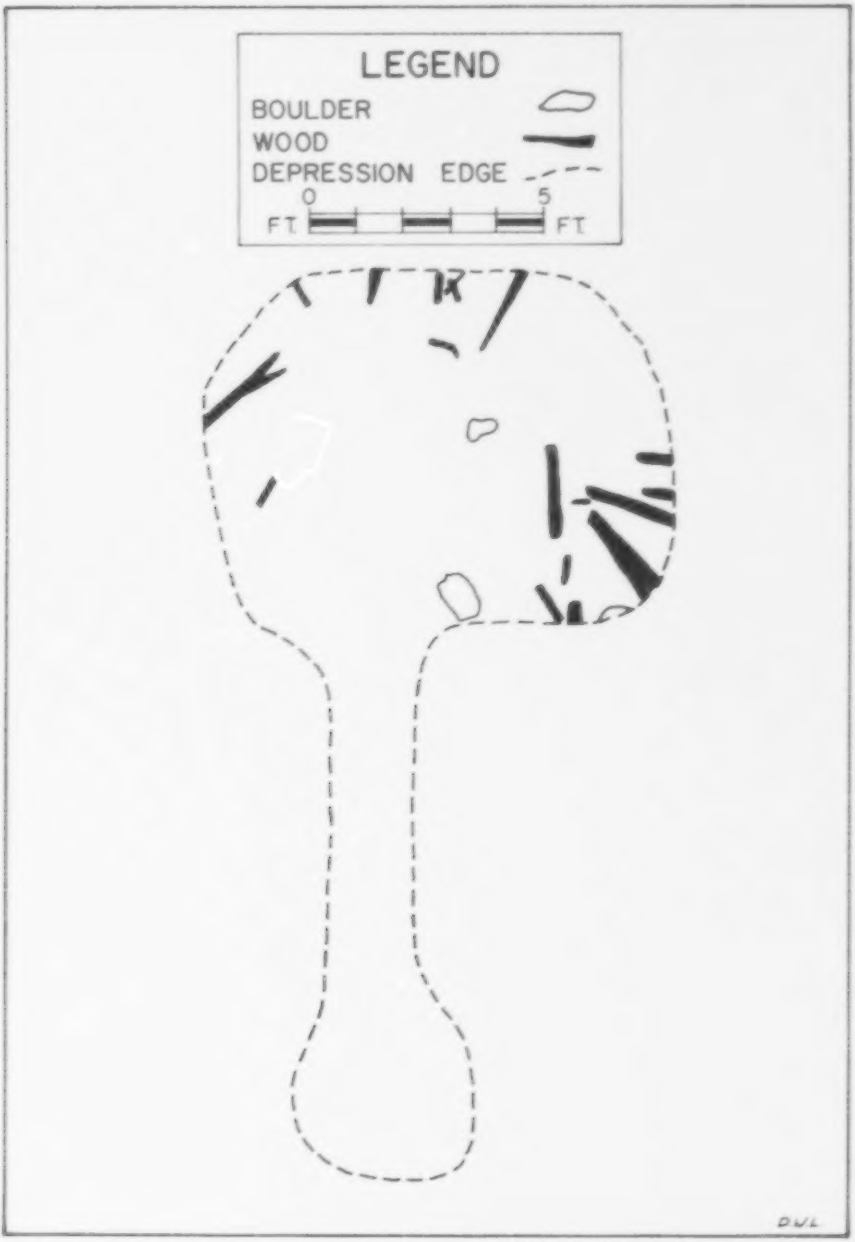

LEGEND
BOULDER
WOOD
DEPRESSION EDGE
0
5
FT
FT
DJL

Fig. 9 Nichol Site, plan of Structure 1

functional, indicates that the houses were occupied during a cold season, perhaps late autumn or early spring. These structures resemble the *qarmat* or autumn houses described by Boas (1888: 547-50) and Mathiassen (1928: 136-38), used by the historic Eskimo of Baffin Island and Melville Peninsula as a temporary dwelling after the abandonment of the summer tent and prior to moving into winter snow houses on the sea ice. Mathiassen (1927*b*: 133-34) considered this type of dwelling to be a degenerate form of the Thule winter house and an element of the later cultures in the area.

Artifacts

Only 20 identifiable artifacts were recovered from this site. In view of the importance of relating Intermediate interval sites to those of known age, comparisons are made where possible.

A. *Sea Hunting Equipment*

Darting harpoon head: 1 specimen

A thin antler dart head approximately 200 mm in length has six pairs of alternate lateral barbs, a gouged line hole offset towards one lateral edge, and a thin wedge-shaped tang, which is broken (Plate IX, fig. a). It has a thin oval cross-section, with maximum dimensions of 13 by 6 mm at the line hole, and tapers to a sharp distal point. Darting harpoon heads with wedge-shaped tangs are rare; they were found only at the Memorana site (Plate I, fig. n), the Nunagiak phase at Point Barrow (Ford 1959: 116), and the Ekseavik phase on the Kobuk River (Giddings 1952: 55). All these specimens are much shorter and heavier than the dart head found at Nichol; vaguely similar dart heads were found in the nineteenth century Netsilik Thom Bay grave (VanStone 1962: 26).

Harpoon ice pick (?): 1 specimen

One fragment of tapered antler shaft is 70 mm long with oval cross-section and maximum dimensions of 21 by 13 mm at the broken proximal end, and it is tapered to a sharp but somewhat battered distal point; a hole is drilled through the shorter axis 70 mm from the distal tip. This is probably the tip of a harpoon ice pick similar to those commonly used in the Thule and Historic periods.

B. *Land Hunting Equipment*

Arrowheads: 6 specimens

Six arrowheads were found, only one of which (Plate IX, fig. b) is complete. The complete specimen is 142 mm long with a single lateral barb, a conical tang not separated from the shaft by a sharp shoulder, and an irregular swelling or knob on the tang instead of opposed spurs; three proximal fragments of arrowheads have tangs of the same conformation. Of the two distal fragments, one (Plate IX, fig. c) is curved and the single lateral barb is broken, whereas the other (Plate IX, fig. d) had at least two deeply undercut unilateral barbs. Arrowheads of this general type are common to both Thule and Historic periods, but most have spurred rather than knobbed tangs. In the eastern Arctic, knobbed tangs appear at the fairly early Thule site of Naujan (Mathiassen 1927*a*: Plate 8, figs. 2, 6), and in the Inugsuk period in northwestern Greenland (Holtved

1944: Plate 12, fig. 29; 1954: 99). They appear at the Jackson site at Cape Parry (Taylor n.d.), the Cape Cardwell and Cape Kellett sites on Banks Island (Manning 1956: Plate 17, fig. q, Plate 20, fig. g), and in association with harpoon heads suggesting a middle to late Thule date at the Lady Franklin Point site (Taylor n.d.). At Point Barrow they are characteristic of the Nunagiak phase but also occur in the Birnirk and recent Utkiavik phase (Ford 1959: 134).

Wound pins: 2 specimens

One antler wound pin is 135 mm long, has a lanceolate blade with two sharp edges tapered to a distal point, and has an expanded rounded proximal head (Plate IX, fig. h). A second specimen (Plate IX, fig. g) is only 66 mm long and may be a toy wound pin or bodkin. Wound pins of this type are characteristic of both Thule (Mathiassen 1927*b*: 41) and historic Copper Eskimo (Jenness 1946: Fig. 148) cultures, where they may have been used for sealing.

Bolas ball: 1 specimen

The single bolas ball (Plate IX, fig. i) is cut from a segment of antler, smoothly ovoid in shape with maximum dimensions of 35 by 24 by 24 mm; the hole through the narrow edge is drilled from both sides. This is a characteristic Thule culture element (Mathiassen 1927*b*: 53) but was not used by the historic Copper Eskimo.

C. *Fishing Equipment*

Fish spear centre prong (?): 1 specimen

A thin antler shaft 88 mm in length has two pairs of opposed lateral barbs at the distal end; the proximal end is cut diagonally, and both lateral edges are roughened (Plate IX, fig. e). This may be a centre prong for a small fish spear, similar in form to those found at Memorana (Plate II, figs. q-s) (*see* p. 29).

D. *Transportation Equipment*

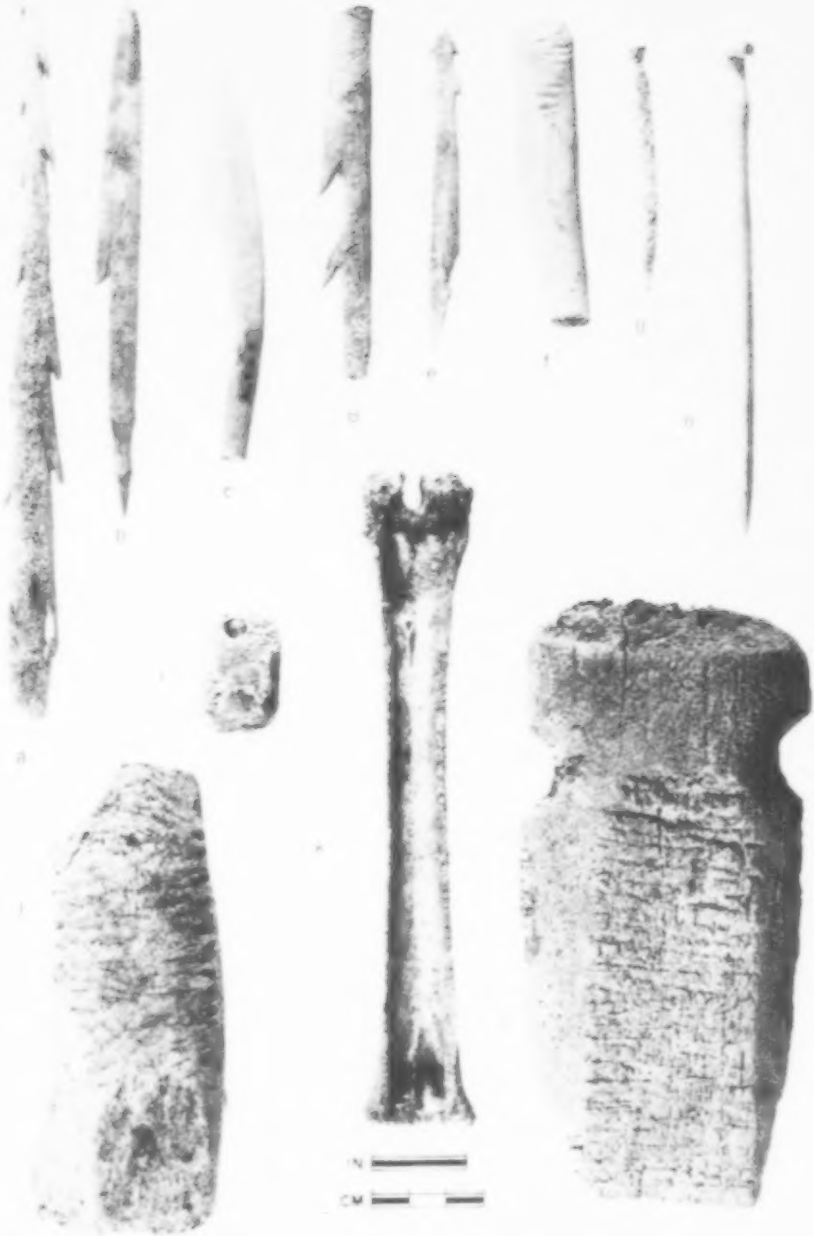
Not represented at this site.

E. *Men's Tools*

Adze socket: 1 specimen

A broken specimen of whale bone (Plate IX, fig. j) is 125 mm long with a wedge-shaped butt expanding to a maximum oval cross-section of 45 mm by approximately 30 mm. The distal end is broken but appears to have contained a socket for the adze head; the flat ventral surface is roughened and polished by being hafted against the handle; the opposite dorsal surface is rounded and roughened for lashing but lacks holes or grooves. This specimen appears to be a crude and simple variant of the drilled or grooved adze heads common to both Thule (Mathiassen 1927*b*: 75-78) and Copper Eskimo (Jenness 1946: Fig. 19) cultures.

Plate IX
Nichol Site: Miscellaneous Artifacts
a. Darting harpoon head
b. Arrowhead
c. Arrowhead fragment
d. Arrowhead fragment
e. Fish spear centre prong (?)
f. Asymmetric antler knife
g. Toy wound pin
h. Wound pin
i. Bolas ball
j. Adze socket
k. Beaming tool
l. Mattock head


a
b
c
d
e
f
g
h
IN
CM

Mattock head: 1 specimen

A small mattock or wedge (Plate IX, fig. l) appears to have been reworked from a whale bone mattock head of the standard Thule type. The specimen is 160 mm long, with maximum lateral dimensions of 70 and 30 mm; there is one pair of opposed square notches, and both dorsal and central surfaces are tapered to a sharp distal edge.

F. *Women's Tools*

Asymmetric antler knives: 2 specimens

One incomplete specimen (Plate IX, fig. f) has a straight blade thinned to one sharp edge, tapered proximally to an oval shaft and with a square-cut distal end. A second specimen is of the same general shape but is much more crudely made. These fragments of asymmetric antler knives or scrapers resemble a specimen illustrated by VanStone (1962: Plate 8, fig. 16) from the nineteenth century Netsilik Thom Bay grave.

Beaming tool: 1 specimen

A beaming tool with two sharp edges is made from a split caribou metapodial (Plate IX, fig. k). This element, rare in Canadian Thule culture, is not known from the historic Copper Eskimo. Bone beamers occur throughout the sequence at Point Barrow but are especially characteristic of the Birnirk period (Ford 1959: 193) and in all periods on the Kobuk River (Giddings 1952: 78).

Wooden ladle: 1 specimen

A small fragment of a wooden scoop or ladle is not complete enough to be useful for comparison.

Pottery fragments: 2 specimens

Two tiny sherds are black in colour, coarse in texture, and heavily tempered with pieces of gravel 2 to 5 mm in diameter. They appear identical to the sherds found at Memorana.

As can be seen from the comparisons made above, none of the artifacts found are conclusively diagnostic of historical relationships. In general, the greatest resemblance is to the Thule culture; none of the artifacts would be considered exceptional if found on a Thule period site such as Memorana, whereas several (arrow-head with knobbed tang, bolas ball, beamer, pottery) would be out of place in the historic Copper Eskimo assemblages now known. On the basis of the artifacts found, there is no reason to distinguish the Nichol site from the Thule period; the assignation of the site to the Intermediate interval is based on the structures only, and implies that localized adaptations occurred during the Thule period.

The Buliard Site

The Buliard site (OhPo-3) occupies the edge of a gravel beach ridge perpendicular to the west bank of Kuujjua River and 500 yards inland from Minto Inlet (Fig. 8). It consists of 11 semisubterranean structures, all of which were tested and two of which were partially excavated. Although excavation was severely limited by permafrost, floor level was reached in at least one structure. These structures are practically identical to those found at the Nichol site: they have oval to subrectangular main chambers without slab floors or bench areas and a sloping entrance passage approximately 10 feet in length extending down the slope of the beach ridge. In one of the structures excavated there is a noticeable step between the entrance passage and the main chamber, as in the *qarmaq* illustrated by Boas (1888: Fig. 498).

Very few fragments of bone refuse were found either in the houses or in the surrounding area. The only artifacts directly associated with the structures are two unidentifiable fragments of worked antler (Plate X, fig. i) and a few small sherds of black pottery very similar to that found at the Nichol site. On the surface near one of the structures was a fragment of a fish spear centre prong (Plate X, fig. h) of the bilaterally barbed type used by the historic Copper Eskimo. A piece of perforated oilcloth was frozen in clear ice beneath a moss hummock in the entrance passage to one of the structures; although this may have been intrusive, since some of the houses had been recently disturbed, its situation would seem to indicate otherwise. Oilcloth was available to the natives of the area at least as early as 1839 (Simpson 1843: 389).

The age of this site is impossible to assess. The structures appear to be more recent than those of the Nichol site and indeed do not look much older than meat storage pits which, according to local informants, were dug into the site during the 1930's. The presence of the fragments of oilcloth, if not intrusive, would suggest a historic or late prehistoric date. Structures probably similar to the ones found at this site are described by the earliest European to penetrate the Copper Eskimo area: Hearne (1958: 108-109) stated that the Eskimos he observed near the mouth of the Coppermine River in 1771 built structures that were more substantial than the tents occupied during the summer season. The passage is worth quoting in full:

> Their tents are made of parchment deer-skins in the hair, and are pitched in a circular form, the same as those of the Esquimaux in Hudson's Bay. These tents are undoubtedly no more than their Summer habitations, for I saw the remains of two miserable hovels, which, from the situation, the structure, and the vast quantity of bones, old shoes, scraps of skins, and other rubbish lying near them, had certainly been some of their winter retreats. These houses were situated on the South side of a hill; one half of them were under-ground, and the upper parts closely set round with poles, meeting at the top in a conical form, like their Summer-houses or tents. These tents, when inhabited, had undoubtedly been covered with skins, and in Winter entirely overspread with the snow-drift, which must have greatly contributed to their warmth. They were so small, that they did not contain more than six or eight persons each; and even that number of any other people would have found them but miserable habitations.

Steensby (1917: 122) considered this a reference to "indubitable winter houses." If Hearne's description is correct, these semisubterranean structures with a skin roof over a conical framework of poles would seem more likely to be a variant of the *qarmat* described by Boas and Mathiassen, and perhaps the type of structure represented at the Buliard site. This site may have been occupied as late as the eighteenth century.

The Tardy Site

The Tardy site (OhPo-2), which is located on the east bank of Kuujjua River, includes 115 boulder structures scattered over a mossy slope 500 to 1100 yd inland from Minto Inlet (Fig. 8). Forty-four of these structures are heavy oval tent rings averaging 7 by 8 feet in dimensions

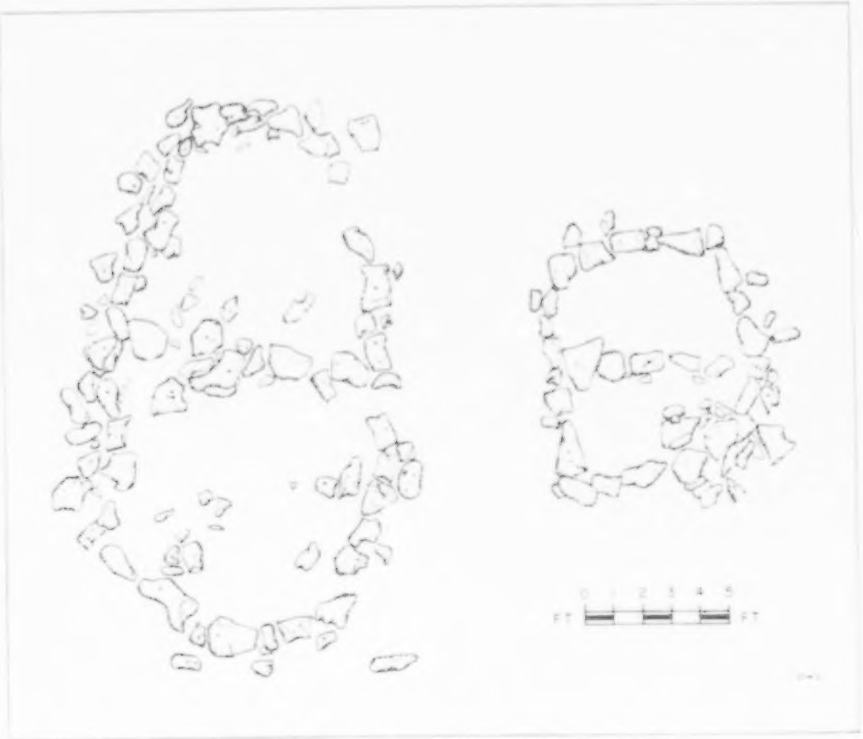


Fig. 10 Tardy Site: plan of Structure 42 (left) and 43 (right)

but ranging in size up to 12 by 19 feet. Many of these tent rings have a line of boulders across the centre of the shorter axis (Fig. 10), probably marking the edge of the sleeping area, as in the historic Iglulik tent rings described by Mathiassen (1928: 133). There are also three heavy stone-vaulted graves, one rectangular stone hut, and a large number of heavy rectangular caches. The area of the site was searched and tested thoroughly, but artifacts and bone refuse were very scarce. The five tent rings and the two badly disturbed burials that were excavated yielded only six identifiable artifacts and a few bone fragments, most of which represented either seal or bird.

Three antler arrowheads were found, again of the single barbed variety characteristic of Thule and historic Copper Eskimo cultures (Plate X, figs. b, c); tangs are conical and have opposed spurs instead of the knobbed tangs of Nichol site arrowheads. One flat antler lance head (Plate X, fig. a) is 125 mm long with flat oval cross-section, has an end blade socket with drilled rivet hole, a wedge-shaped tang, and two lashing holes just above the tang; this specimen is similar to Thule lance heads found at Naujan (Mathiassen 1927*a*: Plate 6, fig. 5) but lacks the longitudinal grooves found on the Thule specimens. A triangular end blade crudely ground from slate

(Plate X, fig. d) may have been used with a harpoon or lance. A second fragment of crudely ground slate may have been used as the blade of a women's knife. A nodule of chalcopyrite is somewhat battered and may have been used for striking fire. Finally, five small fragments of heavily rusted steel, all apparently cut from the blade of a rip-saw, were found beneath the floor level inside the same tent ring that produced the lance head and one of the arrowheads.

The dating of this site is again uncertain. Flat lance heads, flexed burials in boulder vaulted graves, and heavy tent rings of the type found at this site are not known from the historic Copper Eskimo culture. On the other hand, the excellent preservation of bone fragments found on the surface, and the association of saw blade fragments with one of the heavy tent rings and with the flat lance head, suggest a relatively recent date. Bandi and Meldgaard (1952: 64) have suggested a date of A.D. 1600 to 1850 for similar heavy tent rings with a stone platform edge from the Kap Mary region of northeastern Greenland. Hearn (1958: 110) found two small iron fragments in the possession of the Coppermine River Eskimo of 1771, indicating that European iron was reaching the area by that date. An eighteenth-century date for at least part of the Tardy site may not be far wrong.

The Intermediate Interval in the Copper Eskimo Area

Definition

The Intermediate interval has been defined as the period of time during which structures of the *qarmat* type and heavy tent rings with a stone platform edge were built and occupied. Although many of the sites assigned to this category probably were occupied between A.D. 1600 and A.D. 1771, others must have been occupied during the Thule and Historic periods as these periods have been chronologically defined.

Known Sites

Relatively few sites can be assigned to the Intermediate interval. Only three sites with the *qarmat* type of structure are known: Nichol, Buliard, and the site reported by Hearne in the lower Coppermine River valley. Tent ring sites have been found in several localities, although the Tardy site is the largest known. A complex of boulder structures similar to those found at Tardy is located at the bottom of a small bay 5 miles west of the mouth of Kuujjua River (OhPo-1). This site produced a few pieces of worked antler, a hollowed-out polar bear canine (Plate X, fig. f) containing a toy Thule 3 harpoon head with lashing holes (Plate X, fig. g), and a pointed wooden object, which is perhaps a toy fish needle (Plate X, fig. e); the artifacts were associated with the burial of a child in a boulder vaulted grave. A similar site (OePr-2) occurred on a rocky headland across Queen's Bay from the settlement of Holman; one piece of drilled bone and one worked soapstone fragment, as well as a few seal bones, were associated with the structures at this site. A larger site was found on a rocky beach 10 miles southeast of Holman and ½ mile south of the Memorana site; this group of stone structures (site OdPq-2) produced a few seal bones, a wooden arrow shaft, and a wooden adze handle (Plate X, fig. j) of the type used during both the Thule and the Historic periods. A small circular stone hut with a corbelled roof was associated with this site, and similar structures were reported by Jenness (1922: 57-58) from several other localities in the Copper Eskimo area. The locations of these sites are indicated on Figure 7.

Culture of the Intermediate Interval Population

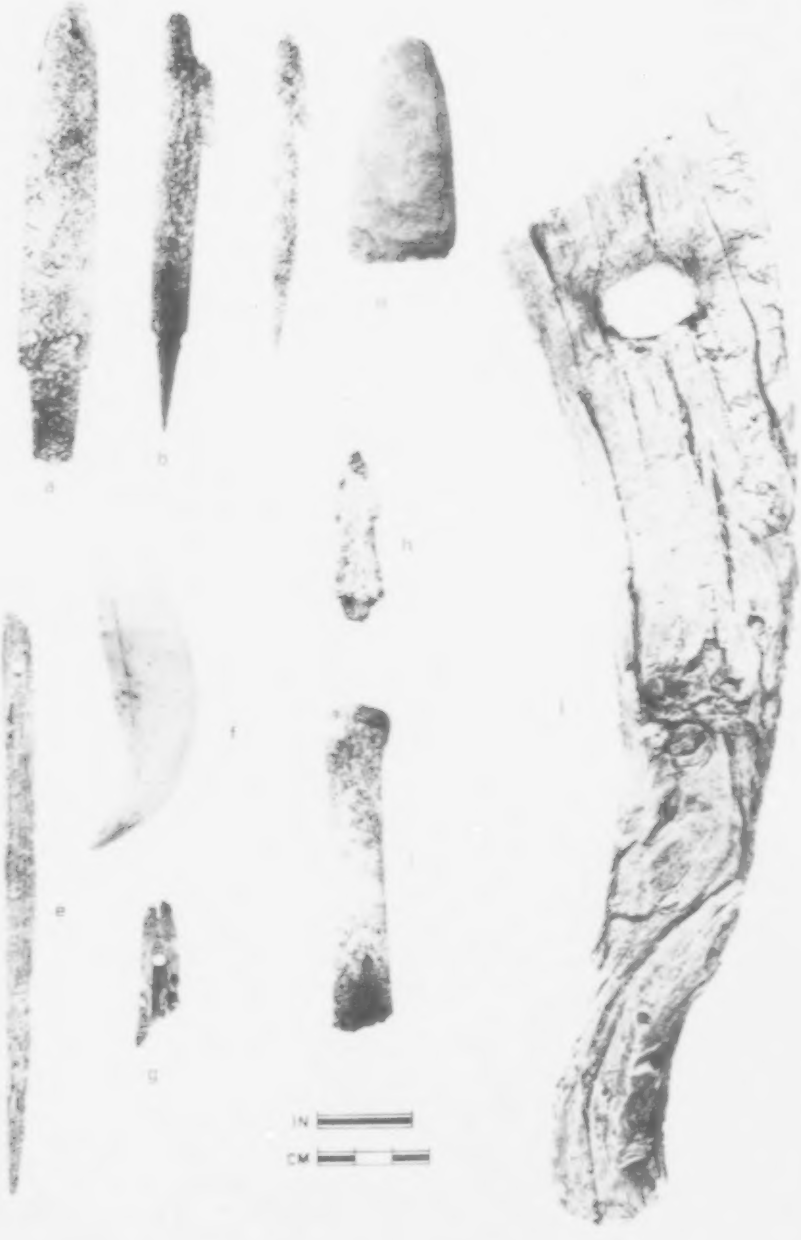
As our knowledge of the Intermediate interval in the Copper Eskimo area is even more meagre than our knowledge of the Thule period, reconstruction of the culture must be correspondingly more tenuous. Perhaps the most important observation that can be made regarding the Intermediate interval sites located is that none of these sites appear to have been occupied during the winter season. This contrasts sharply with the Thule pattern revealed by a series of small villages containing winter houses heavily constructed of flagstones, wood, and sod. The absence of such dwellings from Intermediate sites suggests that during this period of time most of the winter season was spent in snow house villages on the sea ice, which was the pattern followed by the historic Copper Eskimo. If Damas (1969*b*: 51) is correct in suggesting that large aggregations of hunters are usually required to surmount the probability factor inherent in breathing-hole sealing from the sea ice, then it seems likely that the large impermanent winter groupings characteristic of Copper Eskimo winter life may have already formed during the Intermediate interval.

The locations of the tent ring sites assigned to the Intermediate interval would seem to have been suited to spring and early summer sealing from the ice edge, through cracks or leads in the melting ice, or in the ice-free mouths of rivers. The few animal bones found at these sites are predominantly those of ringed seal. The large number of tent rings and other structures at sites such as Tardy, combined with the scarcity of occupation refuse, suggests that the site locality was used repeatedly by small groups of people who occupied each structure for a short period while engaged in coastal sealing.

The Nichol site, with structures of the *qarmat* type assumed to have been used during the autumn or early winter, yielded very few caribou bones and a large quantity of seal bones. Structures of the type used during the Intermediate interval have not been noticed at autumn caribou hunting localities (Kuuk River mouth, Ekalluk River, Cambridge Bay area) examined by Taylor and myself. The tentative conclusion is that caribou hunting was less important to the people of the Intermediate interval than it was to the people of the Thule and Historic periods. Although some caribou must have been hunted for clothing, and although fishing was probably as important as it was during other periods, it seems likely

Plate X
Other Intermediate Interval Sites
Miscellaneous Artifacts

a	Lance head	OhPo-2
b	Arrowhead fragment	OhPo-2
c	Arrowhead	OhPo-2
d	Ground slate end blade	OhPo-2
e	Toy fish needle (?)	OhPo-1
f	Polar bear canine tooth	OhPo-1
g	Toy harpoon head	OhPo-1
h	Fish spear centre prong fragment	OhPo-3
i	Worked antler fragment	OhPo-3
j	Adze handle	OdPq-2


a
b
d
h
e
f
g
i
j
IN
CM

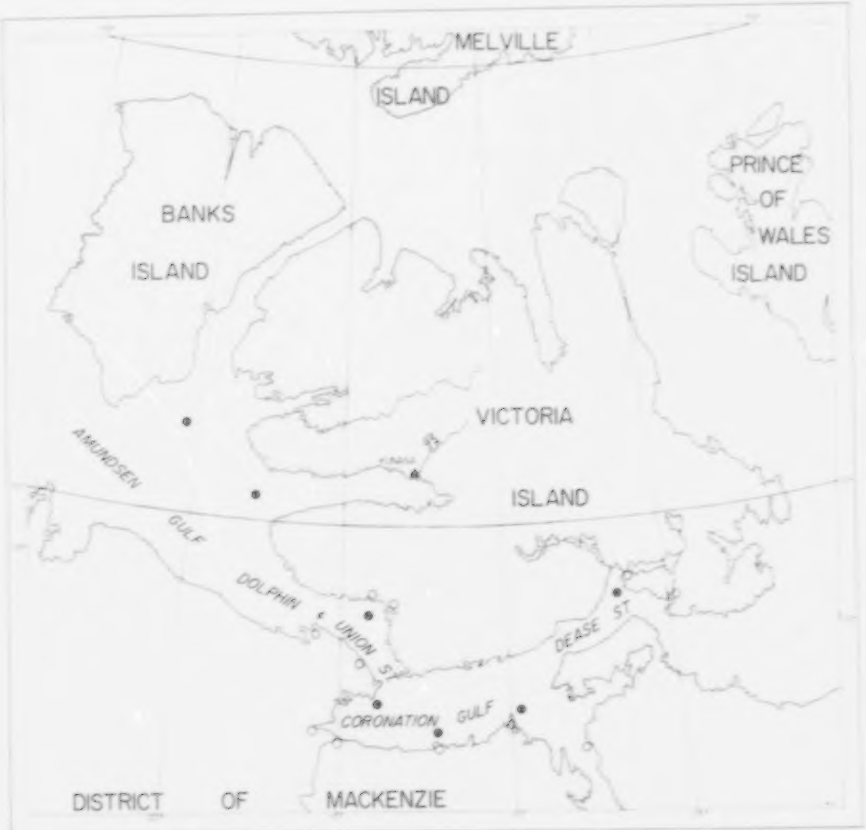

MELVILLE
ISLAND
BANKS
ISLAND
PRINCE
OF
WALES
ISLAND
VICTORIA
ISLAND
AMUNDSEN
GULF
DOLPHIN
UNION
S
DEASE
ST
CORONATION
GULF
DISTRICT
OF
MACKENZIE

Fig. 11. Locations of Historic period occupations. Winter villages (solid circles) and autumn camps (open circles). After Jenness (1922).

that during the Intermediate interval a larger proportion of the spring, summer, and autumn seasons was spent in small coastal sealing camps. The hunting group, as previously defined, was probably the primary social unit throughout most of the non-winter season.

The Historic Period

Samuel Hearne (1958) was the first European to encounter the Eskimo of the Coronation Gulf area. His brief description of the group he saw at Bloody Falls in the summer of 1771 strongly suggests that these people were the ancestors of those inhabiting the area in the early twentieth century, when they became known as the Copper Eskimo. Hearne's visit in 1771 may be used to mark the beginning of the Historic period, which ended approximately 150 years later when Copper Eskimo culture was transformed through massive importation of European material culture and the introduction of a trading economy. The Kunana site is the only excavated archaeological component to be definitely identified as a historic Copper Eskimo occupation. Most of the features of this site may be recognized through early twentieth century ethnographic descriptions, which are thus given an additional time depth of 50 or perhaps 100 years. A few other features do not coincide with ethnographic evidence and may represent elements of an earlier stage of Copper Eskimo culture.

The Kunana Site

The Kunana site (OdPc-1) is located on a series of small river terrace remnants on the west bank of Kuuk River, 200 to 500 yards north of the mouth (Figs. 11, 12). Kuuk River is a small stream that flows into the northeastern end of Prince Albert Sound, western Victoria Island; the river heads in Tahiryuak Lake approximately 25 miles inland, where there is a noted source of native copper. There is a good run of Arctic char in Kuuk River and a large boulder weir is located in the river directly in front of the site. On the raised gravel beaches to the north and west of the site is a complex series of caribou drive lanes, which appear to have been designed to collect eastward-moving caribou and to concentrate them in an area where there is a steep cut-bank on the west side of the river (Taylor 1967: Fig. 12). Artifacts associated with the drive lanes suggest that this system was related to the occupation of the Kunana site. Of over 3,000 pieces of bone identified, 96 per cent were of caribou and the remaining 4 per cent represented bird (2 per cent), muskox (1 per cent), ringed seal (1 per cent), hare, and wolf or dog; a few fish bones were found scattered throughout the site.

Caribou hunting was obviously the most important economic activity during the season of occupation, although fishing is also suggested by the presence of the weir and by a large proportion of the artifacts found. This evidence suggests a recurring autumn occupation of the site by small bands who had returned to the coast in order to store caribou and fish for the lean months of late autumn, to prepare winter clothing and equipment, and to wait for the formation of solid sea ice. A more complete report on the 1966 excavation of this site is on file with the Archaeology Division, National Museum of Man.

Structures

The 72 structures associated with the site may be divided into four categories, three of which are probably types of dwellings; the fourth and largest category (41 structures) includes heavy boulder caches of rectangular or nondescript shape.

Nine of the dwelling structures may be termed "triangular tent pits"; they are simple excavated pits 4 to 8 in deep and range in overall size from approximately 3 by 4 ft to 6 by 7 ft. In plan view they resemble isosceles or right-angled triangles, usually with the shorter edge to the west and the apex extending downslope to the east and toward the river. A shallow depression flanked by low gravel mounds usually extends outward from the apex. Three of the pits have a small but well defined niche formed by extending the basal wall for a few inches past the left corner. One pit is surrounded by a low turf ring, and

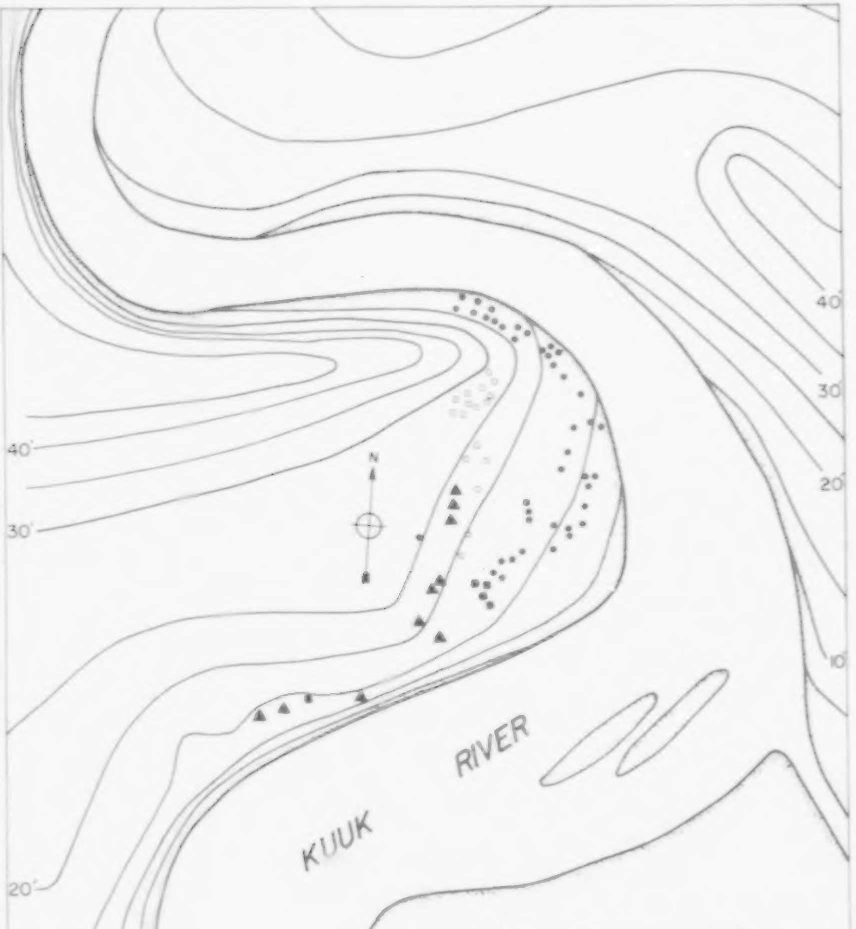

40'
30'
20'
10'
40'
30'
20'
10'
N
KUUK
RIVER
LEGEND
TRIANGULAR TENT PIT ▲
IRREGULAR TENT PIT ■
OVAL TURF RING ○
CACHE ●
CONTOUR INTERVAL APPROX 5'
0 50 100
YDS YDS

Fig. 12. Map of Kunana Site.

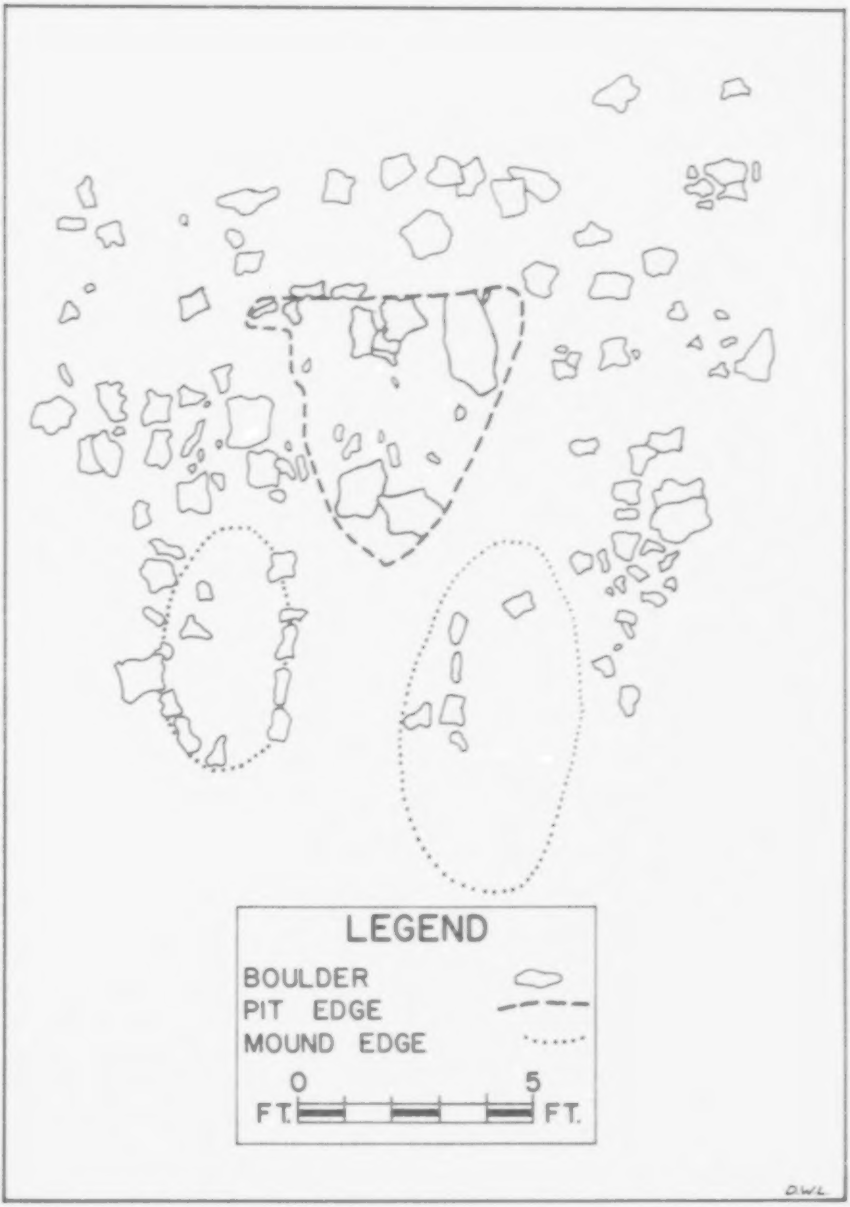

LEGEND
BOULDER
PIT EDGE
MOUND EDGE
0
5
FT.
FT.
D.W.L.

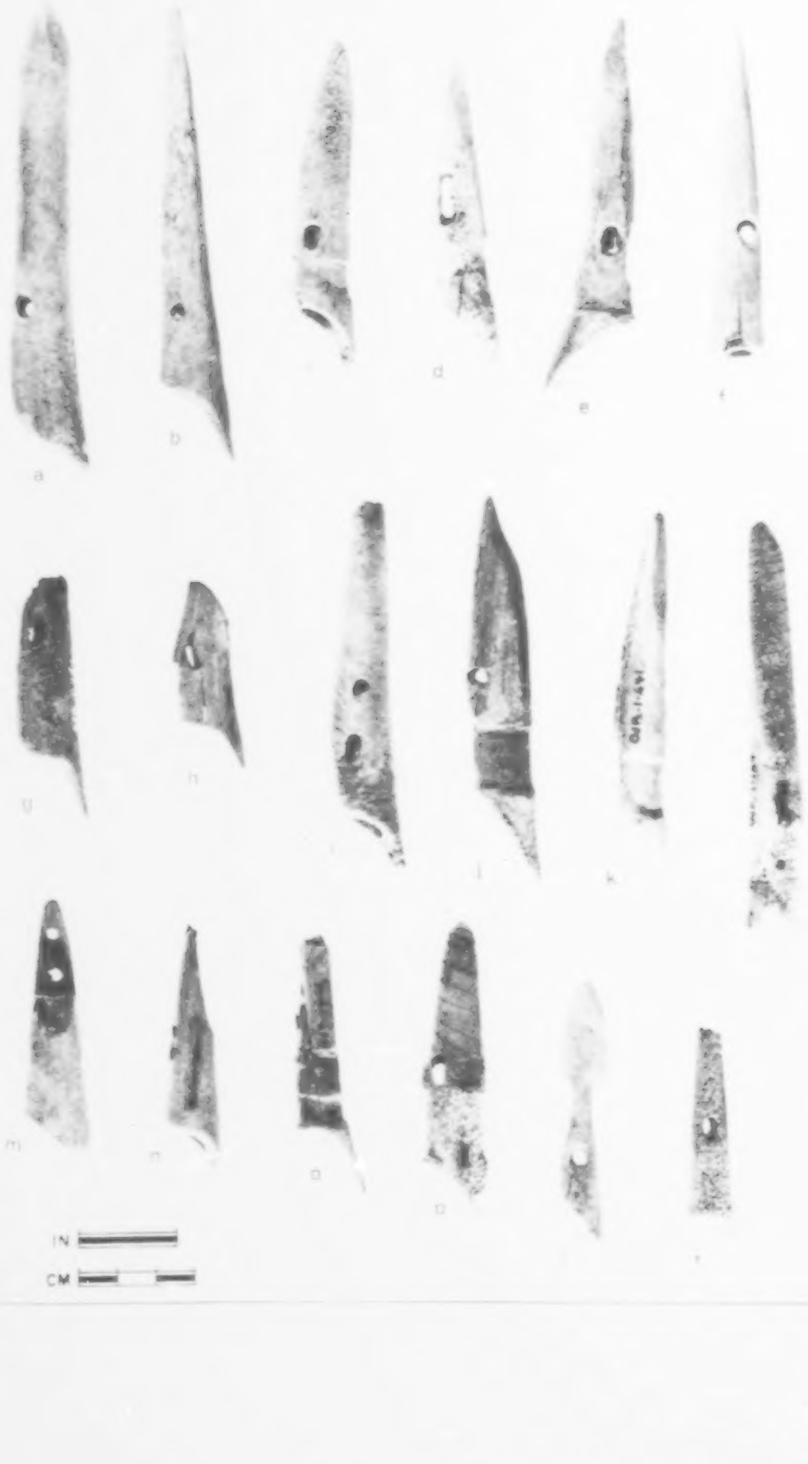
Fig. 13. Kunana Site, plan of Structure 6.

two others by rings of small boulders, which appear to have weighted the edges of circular tents approximately 12 ft in diameter (Fig. 13). The boulders surrounding the other tent pits have probably been removed in order to build caches. A few bone fragments and artifacts were found within the pits and in the surrounding area, but these were generally scarce. The only European materials associated with these structures are a small piece of wire and a tin arrow end blade which suggests that the pits were occupied during a period when trade goods were still relatively scarce in the area. Although similar structures have not been reported ethnographically, three were noted at a small site ½ mile west of Kuuk River, where rectangular floor plans and wooden tent toggles indicate that European tents were being used.

Five other structures may be termed "irregular tent pits." These are somewhat larger pits 7 to 9 in deep, ranging in size from 5 by 6 ft to 9 by 12 ft, and are extremely irregular in outline. There are no associated boulder rings, but the boulders have likely been removed to build a large complex of caches located adjacent to the irregular pits. Bone refuse, artifacts and charcoal are abundant both within the pits and in the surrounding area. A group of four irregular pits produced a majority of the artifacts as well as most of the European trade items found at the site. One or two of these pits retain a vaguely triangular shape, suggesting that they may have been originally of the standard triangular form but have become enlarged by repeated occupations. The preponderance of caribou bone in the refuse deposits associated with these pits suggests that these dwellings were occupied during the autumn when the people were engaged in hunting eastward-migrating caribou at the drive lanes near the site.

The remaining 17 dwelling structures are oval turf rings, ranging in size from a small ring 6 in high and 4 ft by 5 ft outside dimensions to a large oval mound 2 ft high and 13 ft by 16 ft outside dimensions. Excavation in these structures yielded very few artifacts, very little bone refuse, and the only European materials found were two fragments of tin cans. Jenness (1922: 59, 81) observed that turf rings were used to anchor the walls of temporary tents, and that

Plate XI
Kunana Site: Harpoon Heads
a Harpoon head, Kunana Closed Socket type
b Harpoon head, Kunana Closed Socket type
c Harpoon head, Kunana Closed Socket type
d Harpoon head, Kunana Closed Socket type
e Harpoon head, Kunana Closed Socket type
f Harpoon head, Kunana Closed Socket type
g Harpoon head, Kunana Closed Socket variant
h Harpoon head, Kunana Closed Socket variant
i Harpoon head, Kunana Closed Socket variant
j Harpoon head, Kunana Closed Socket variant
k Harpoon head, Kunana Closed Socket variant
l Harpoon head, Kunana Closed Socket variant
m Harpoon head, Kunana Closed Socket variant
n Harpoon head, Kunana Closed Socket variant
o Harpoon head, Kunana Closed Socket variant
p Harpoon head, Kunana Closed Socket variant
q Harpoon head, Kunana Closed Socket toy
r Harpoon head, Kunana Closed Socket toy


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
IN
CM

during the spring tents were often raised on walls of turf to keep out surface water. These structures, concentrated on a terrace at the northwestern end of the site, may have been used during temporary spring occupations when the main occupation area, in a more sheltered locality, was still covered with drifted snow. The turf rings may have been occupied during the same time period as the triangular tent pits; this is suggested by the scarcity of European material in both types of structure and by a small triangular pit within one of the turf rings.

Artifacts

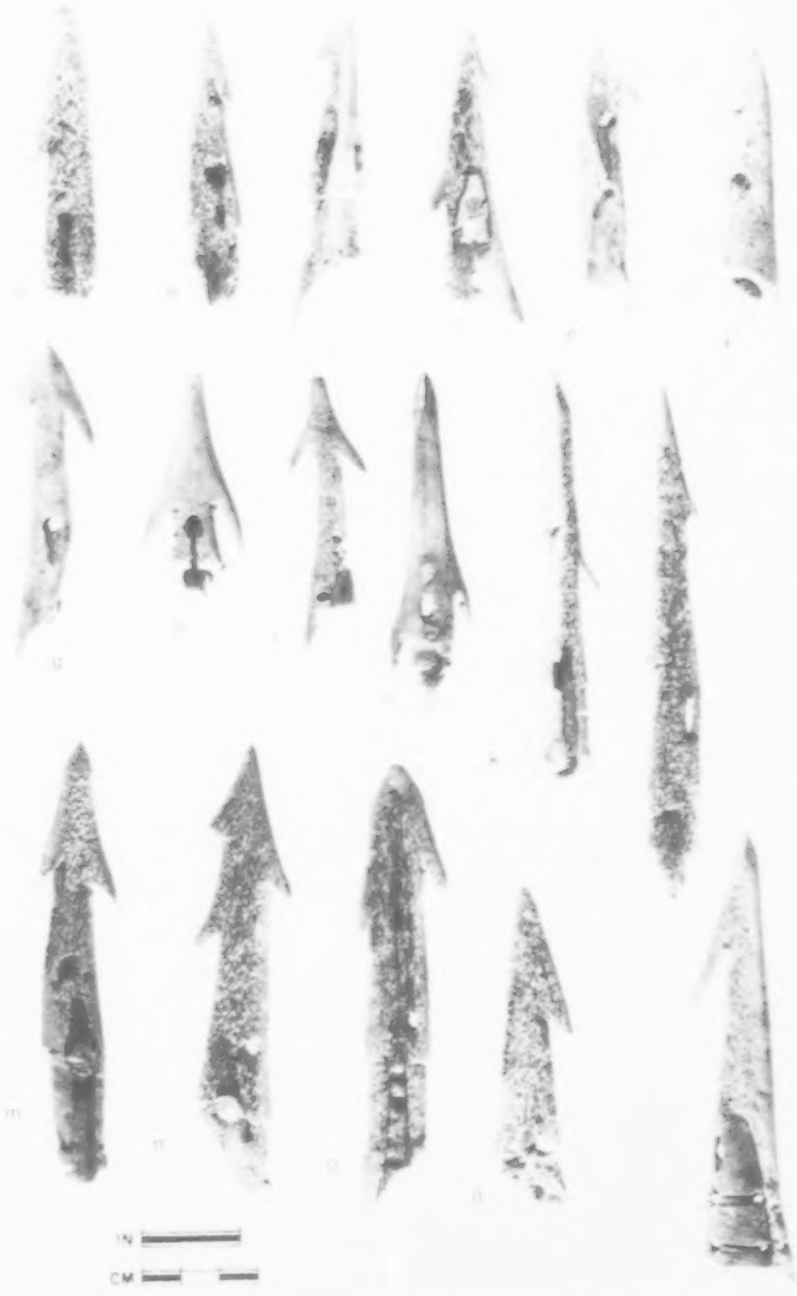
A. *Sea Hunting Equipment*

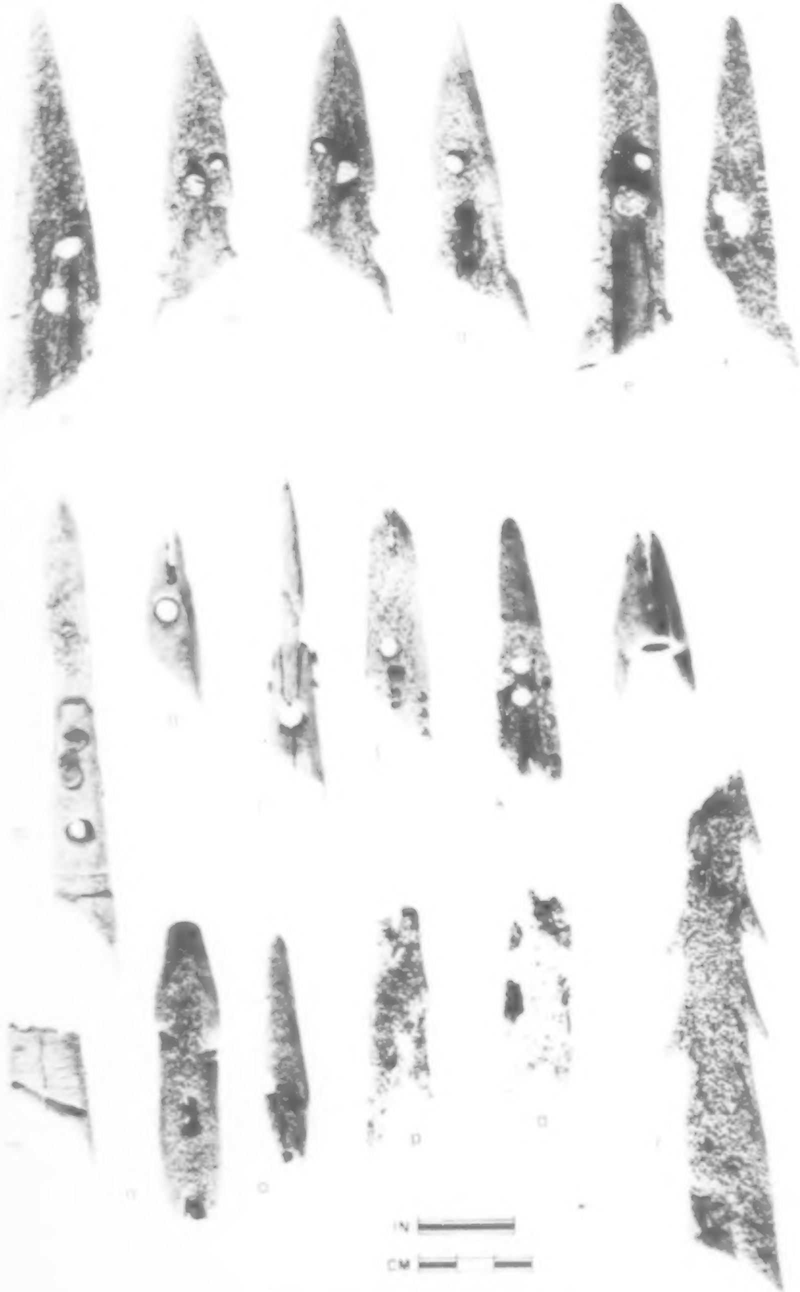
Sealing harpoon heads: 53 specimens

(a) Kunana Closed Socket type: Six typical specimens, 10 variants, and two toy specimens were found; a new type definition appears to be warranted. The typical specimens (Plate XI, figs. a-f) range in length from 86 mm to 129 mm with mean length of 99 mm. The shaft has a tapered oval cross-section with one relatively sharp edge on the side opposite the spur. The line hole is either drilled or gouged, and passes through the thin edge perpendicular to the plane of the spur. The distal end is either tapered to a sharp conical point or thinned to a flat point. The butt is flat or concavely oblique and extends to a single strong spur. The socket is closed, but in three specimens lashing beds have been added to reinforce broken sockets. Two short specimens (Plate XI, figs. g,h) are probably proximal fragments of the typical form. One specimen (Plate XI, fig. i) has two oblique holes in the shaft, probably to accommodate inserted barbs. The line hole of one specimen is double and parallel to the plane of the spur (Plate XI, fig. k). One specimen is of the typical form but has an open socket (Plate XI, fig. j). Five fragmentary specimens (Plate XI, figs. l-p) represent composite forms which seem to resemble the Kunana closed socket type. Two small specimens (Plate XI, figs. q,r) are probably toys.

(b) Closed socket barbed forms: Three specimens (Plate XII, figs. a, b, f) have a single barb near the distal end, but otherwise approach the Kunana closed socket form. Three other specimens (Plate XII, figs. c-e) are very light and crudely made, with broken sockets reinforced by lashing beds. Two small specimens with closed sockets and a single pair of symmetrical barbs (Plate XII, figs. g, i) vaguely resemble Ford's (1959: 87) Nunagiak barbed closed socket type. Another (Plate XII, fig. h) is a variant of the same type, with the spur rotated 90° and the barbs just distal to the line hole. A composite specimen (Plate XII, fig. j) has two components joined with copper rivets, one pair of asymmetric proximal

Plate XII
Kunana Site: Harpoon Heads
a. Harpoon head, closed socket barbed
b. Harpoon head, closed socket barbed
c. Harpoon head, closed socket barbed
d. Harpoon head, closed socket barbed
e. Harpoon head, closed socket barbed
f. Harpoon head, closed socket barbed
g. Harpoon head, closed socket barbed
h. Harpoon head, closed socket barbed
i. Harpoon head, closed socket barbed
j. Harpoon head, closed socket barbed
k. Harpoon head, open socket barbed
l. Harpoon head, open socket barbed
m. Harpoon head, open socket barbed
n. Harpoon head, open socket barbed
o. Harpoon head, open socket barbed
p. Harpoon head fragment, open socket barbed
q. Harpoon head, composite socket, barbed


g
m
n
o
p
IN
CM


IN
CM

barbs, and a drilled hole near the distal end for insertion of a third barb. One large harpoon head (Plate XIII, fig. r) resembles Ford's (1959: 92) Utkiavik closed socket type, found on recent sites in the Point Barrow area.

(c) Open socket unbarbed forms: Six specimens (Plate XIII, figs. a-f) resemble the Thule 1 type (Mathiassen 1927*b*: 14), but have laterally offset line holes and bone pegs set into the distal ends of the sockets. One of these specimens (Plate XIII, fig. b) has a small distal barb, but all other features are identical to those of an unbarbed specimen with which it was associated (Plate XIII, fig. c). The bone peg set into the socket is apparently designed to reinforce the cancellous antler of the harpoon head against the thrust of the foreshaft.

(d) Open socket barbed forms: Two long slender harpoon heads (Plate XII, figs. k,l) have partly open sockets and lashing beds, laterally offset gouged line holes, and a single pair of asymmetrically placed lateral barbs. Four others (Plate XII, figs m-p) are heavier, and have bone pegs set into the sockets, laterally offset line holes, and one to three heavy distal barbs; these specimens resemble crude Thule 2 forms (Mathiassen 1927*b*: 15). One well made specimen (Plate XII, fig. q) is of the same general form but has a single strong barb and the socket is closed by a small antler plate held in place by lashing through two sets of holes.

Plate XIII
Kunana Site: Harpoon Heads
a Harpoon head, open socket unbarbed
b Harpoon head, open socket unbarbed
c Harpoon head, open socket unbarbed
d Harpoon head, open socket unbarbed
e Harpoon head, open socket unbarbed
f Harpoon head fragment, open socket unbarbed
g Harpoon head, end bladed
h Harpoon head, end bladed
i Harpoon head, end bladed
j Harpoon head, end bladed
k Harpoon head, anomalous
l Harpoon head, anomalous
m Harpoon head fragment, anomalous
n Harpoon head, anomalous
o Harpoon head, anomalous
p Harpoon head (Dorset ?)
q Harpoon head (Dorset ?)
r Harpoon head, large closed socket barbed form

(e) End bladed specimens: One specimen (Plate XIII, fig. g) has a closed socket and corresponds to the Thule type AIIc2 (Mathiassen 1927*b*: 21). Two others (Plate XIII, figs. h,i) are small variants of Ford's (1959: 93) Nuwuk closed socket type; similar forms are widely distributed among historic Eskimo groups (Mathiassen 1927*b*: 20), and this was the only type collected ethnographically from the Copper Eskimo (Jenness 1946: 116). One fragmentary specimen (Plate XIII, fig. j) is similar but has an open socket and corresponds to Mathiassen's (1927*b*: 18) Thule type AIc1.

(f) Anomalous specimens: Seven anomalous specimens are illustrated (Plate XIII, figs. k-q). Two of these defective harpoon heads (Plate XIII, figs. p,q) are heavily weathered and may be late Dorset culture forms.

Harpoon head blank: 1 specimen

An antler shaft 103 mm long has an oval cross-section, and one end is cut concavely oblique to form a heavy spur; this appears to be a blank for a Kunana closed socket harpoon head.

Harpoon end blades: 8 specimens

Five of the harpoon end blades are of bone or antler, range in length from 59 to 102 mm, and are flat with lateral barbs; barbs may be single (Plate XIII, fig. g), double symmetric (Plate XIII, fig. i), double asymmetric, or triple (Plate XIV, figs. h,i). All complete specimens have two rivet holes near the base, which is straight and thinned for insertion into the socket. Three small lanceolate specimens (Plate XIV, fig. j) may be end blades for arrows instead of for harpoons. Three small ground slate end blades were found (Plate XIV, figs. k,l). All are made from fine green slate, are triangular in outline and are neatly ground in flat facets with sharp edges and straight base. Length ranges from 28 to 32 mm, basal width from 17 to approximately 25 mm, and thickness from 2 to 4 mm.

Harpoon foreshafts (?): 3 specimens

The three specimens that may be tentatively identified as foreshafts for sealing harpoons are tapered antler rods, the only complete specimen being 157 mm in length. Proximal ends are oval to rectangular, whereas distal ends are tapered to a rounded point (Plate XIV, figs. f,g). The historic Copper Eskimo used foreshafts of bone or antler, wedged into the foreshaft sockets with a packing of skin or fur (Jenness 1946: 115-16).

Harpoon foreshaft sockets, or ice chisel sockets: 16 specimens

Seven complete specimens were found, as well as nine identifiable fragments. The most common type, represented by six complete specimens and all nine fragments, is a heavy antler shaft ranging in length from 91 to 220 mm (Plate XIV, figs. a,b). One side of the shaft is scarfed and roughened for attachment, and there are one or more rivets through the scarfed section. The head is expanded from a slight shoulder at a distance of 10 to 60 mm from the distal end, and the foreshaft socket in the distal end is circular to rectangular, ranging in size from 4 by 10 mm to 8 by 17 mm. One specimen has wood fragments in the socket; another has iron stains. This type of foreshaft socket is the most characteristic type of Canadian Thule culture (Mathiassen 1927*b*: 33-34) but has not been reported from the Copper Eskimo. Identical specimens collected from the Copper Eskimo by Jenness (1946: 113-14) are described as sockets for ice chisels.

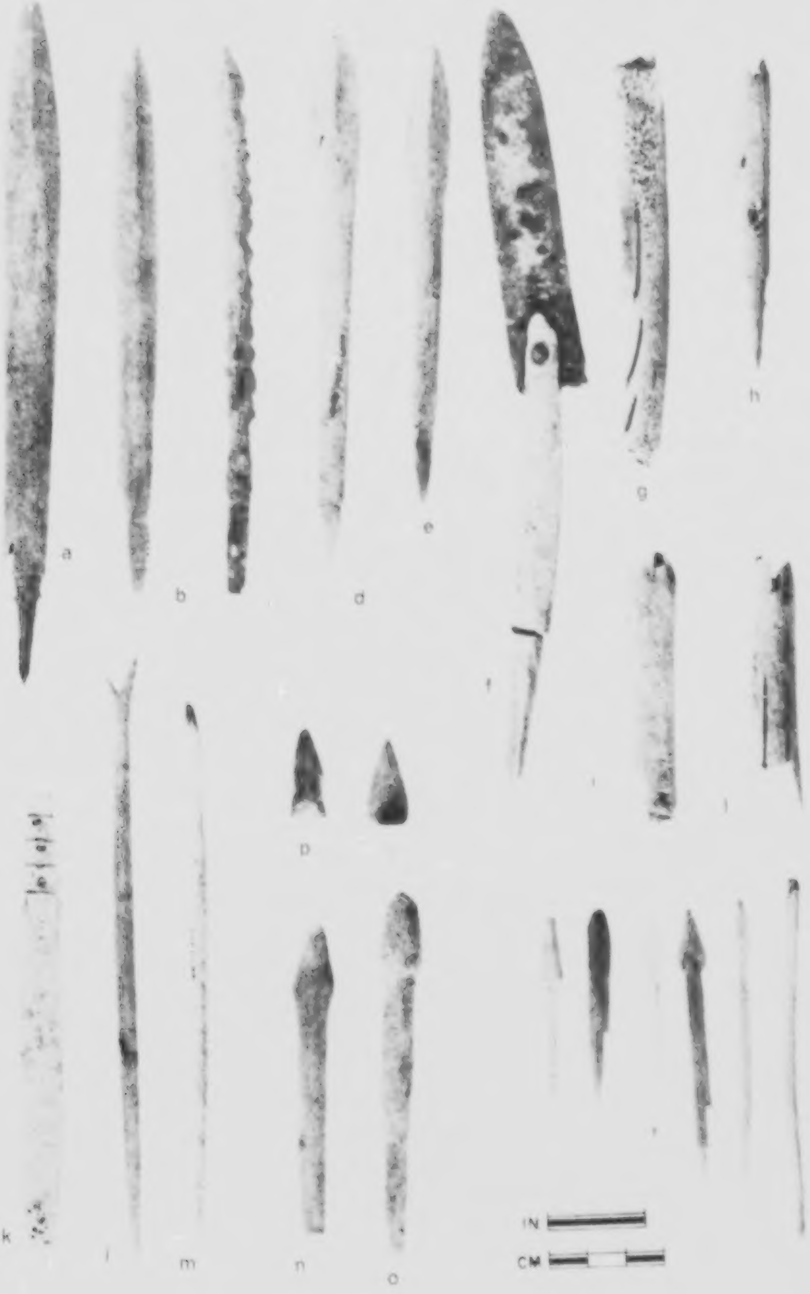
One specimen (Plate XIV, fig. c) has a split tang into which the harpoon shaft was inserted and held by a rivet. The head is bulbous with no shoulder, and the socket is oval. This specimen resembles a Copper Eskimo harpoon foreshaft socket illustrated by Jenness (1946: Fig. 139), but it may also be a lance head such as that illustrated from the same collection (Jenness 1946: Fig. 175).

Harpoon shafts: 2 specimens

Two wooden shaft fragments were found, circular to oval in cross-section and with diameters of 20 to 25 mm.

Plate XIV
Kunana Site: Sea Hunting Equipment
a. Harpoon foreshaft socket
b. Harpoon foreshaft socket
c. Harpoon foreshaft socket
d. Harpoon butt piece (?)
e. Harpoon butt piece (?)
f. Harpoon foreshaft (?)
g. Harpoon foreshaft (?)
h. Harpoon end blade
i. Harpoon end blade
j. Antler end blade
k. Ground slate end blade fragment
l. Ground slate end blade fragment
m. Seal toggle
n. Copper ice chisel (?)
o. Wooden plug

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
IN
CM


a
b
d
e
g
h
f
i
j
p
k
l
m
n
o
r
IN
CM

One fragment shows whipping marks, and the other is obliquely scarfed at one end.

Harpoon butt pieces: 7 specimens

Seven antler rods range in length from 95 mm to 160 mm, have conical to tapered oval cross-sections and sharp distal points (Plate XIV, figs. d,e). On six specimens the proximal end is scarfed and roughened for attachment to a shaft, and one specimen (Plate XIV, fig. e) has a wedge-shaped tang separated from the shaft by slight lateral shoulders. Jenness (1946: 116) states that the Copper Eskimo attached artifacts of this sort to the butt ends of harpoon shafts, in order to stand the harpoon upright in the snow.

Seal toggle: 1 specimen

A well made ivory toggle is 80 mm in length and slightly curved (Plate XIV, fig. m). The concave edge is flat, the others smoothly rounded; the cross-section tapers from 12 by 14 mm at the middle to 5 by 5 mm at either end. A large hole is drilled through the middle for attachment of the drag line. Seven incised rings are set approximately 10 mm apart; the central ring bifurcates on each side of the drilled hole, and four short incised lines radiate from the hole on the convex face. This specimen is identical to a toggle described by Jenness (1946: 122), used for hauling seals over the ice.

Plate XV
Kunana Site: Land Hunting Equipment
a Lanceolate arrowhead
b Lanceolate arrowhead
c Lanceolate arrowhead
d Barbed arrowhead
e Lanceolate arrowhead
f End bladed arrowhead
g Barbed arrowhead fragment
h End bladed arrowhead
i End bladed arrowhead
j End bladed arrowhead fragment
k Marline spike
l Bone pin
m Bone pin
n Blunt arrowhead
o Blunt arrowhead
p Ground slate arrow end blade (Dorset ?)
q Ground slate arrow end blade
r Toy arrowheads

B. *Land Hunting Equipment*

Arrowheads: 115 specimens

(a) Lanceolate arrowheads: 28 specimens were found, 16 of which are complete. All are of bone or antler and have no separate end blades. Complete specimens range in length from 82 to 183 mm with a mean length of 124 mm. All specimens have a flat oval cross-section, usually with one sharp edge; if the cancellous surface is defined as dorsal, then the sharp edge is usually lateral left. Five specimens have a small undercut barb at the base of the left edge (Plate XV, fig. a), and six others have a slight shoulder in the same position (Plate XV, fig. b); one specimen (Plate XV, fig. c) has scalloped lateral edges. Only one of these arrowheads has a conical tang with opposed spurs, one has an oblique scarfed tang, and the remainder have wedge (double scarfed) tangs separated from the shaft by slight shoulders and tapering proximally to a flat point. Jenness (1946: 126) states that lanceolate arrowheads were fairly common among the Copper Eskimo, but not nearly as common as end bladed forms. Stefansson (1919: 96) states that this type of arrowhead was used as a "killing arrow" for slaughtering wounded caribou at close range.

(b) Short lanceolate arrowheads: Nine specimens were found, ranging in length from 45 to 74 mm with a mean length of 63 mm. All are crudely made, and may have been made from broken arrowheads of the longer lanceolate type. Two of the tangs are scarfed and five are wedge-shaped.

(c) Barbed arrowheads: The 16 specimens found are more variable in form than those of the lanceolate class; length ranges from 68 to 143 mm with a mean length of 104 mm. Shafts range in cross-section from flat oval to round and rectangular; the size, shape and position of the barbs varies greatly (Plate XV, figs. d,g). Six tangs are conical with opposed spurs, four are wedge-shaped and none is scarfed. All specimens are within the range of Copper Eskimo arrowheads illustrated by Stefansson (1919) and Wissler (1919); the great variety of these specimens makes precise comparison meaningless.

(d) End bladed arrowheads: 14 specimens were found, ranging in length from 53 to 129 mm with a mean length of 91 mm. Shaft cross-sections vary from flat oval to almost round, and form varies greatly (Plate XV, figs. f,h,i,j). Thirteen end blade sockets are narrow slots into which the blade was set and fastened with a rivet; of the three rivets in place, two are copper and one is iron. One specimen (Plate XV, fig. i) has a bulbous distal end containing a deep oval socket into which a tanged end blade was set. Three specimens have a single lateral barb, and one (Plate XV, fig. j) has a pair of strong barbs. One specimen has a large iron end blade (Plate XV, fig. f) and may be a head for a small lance. Six specimens have conical tangs, none is scarfed, and one is wedge-shaped. These also are within the range of Copper Eskimo arrowheads illustrated by Stefansson (1919) and Wissler (1919).

(e) Blunt arrowheads: Five specimens range in length from 75 to 110 mm. All are crudely made with circular cross-sections expanding to a bulbous distal end and scarfed tangs (Plate XV, figs. n,o). Blunt arrowheads were used for hunting birds (Stefansson 1919: 90).

(f) Toy arrowheads: 22 specimens were found, ranging in length from 47 to 95 mm with a mean length of 67 mm. Carved from small slivers of bone or antler, these copy all classes of true arrowheads (Plate XV, fig. r). Toy arrowheads are not mentioned from ethnographic collections.

(g) Arrowhead tang fragments: 21 proximal fragments from broken arrowheads were found; of these, 11 have conical tangs with opposed spurs, five are scarfed and five are wedge-shaped. These proportions are quite different than those for complete arrowheads: 13 conical, 8 scarfed, 26 wedge-shaped. The discrepancy may be due to a sampling error. Conical tangs are the predominant type in Canadian Thule culture, with scarfed tangs appearing with increasing frequency on later sites (Mathiassen 1927*b*: 45). Wedge-shaped tangs are known from the historic Copper Eskimo, and as Birket-Smith (1945: 162) has pointed out, combine the attributes of conical and wedge-shaped forms.

Arrow end blades: 8 specimens

Only one end blade is made from metal; this specimen (Plate XV, fig. f), probably cut from a tin can, is lanceolate in outline, and is set into a narrow slot and held by a rivet. Five small lanceolate-triangular bone or antler end blades were found, ranging in length from 39 to 80 mm with a mean length of 60 mm; these may have been end blades for either harpoons or arrows. The remaining two end blades are ground from slate; one (Plate XV, fig. q) is a small triangular end blade ground in flat facets, 23 mm long with a basal width of 11 mm. The other (Plate XV, fig. p) is also 23 mm long and ground from the same dark slate but is more crudely made, much narrower and thicker in cross-section, and has shallow side notches. This specimen may have originated in the Dorset occupation area just to the west of the Kunana site, as a similar end blade was collected from the surface of the Dorset site. Hearne (1958: 108) states that most of the Copper Eskimo arrows he saw in 1771 had slate end blades. In 1914, Jenness's informants had no memory of slate end blades, and used only copper or iron (Jenness 1946: 125-26). Bone end blades similar to those found at the Kunana site are illustrated by Stefansson (1919: Fig. 34).

Arrow shafts: 16 specimens

Sixteen fragments of small round wood shafts were found, the largest measuring 165 mm in length. Diameters range from 6 to 10 mm. One small specimen is flattened and has a shallow nock; this is perhaps the butt of a toy arrow shaft.

Marline spike: 5 specimens

A flat and slightly curved strip of bone 122 mm in length has a flat rectangular cross-section, a spatulate distal end, and a proximal end decorated by incised dots and lines joining four pairs of lateral notches (Plate XV, fig. k). This specimen is identical in form, although somewhat smaller, to Copper Eskimo marline spikes described by Jenness (1946: 129). Four other specimens are crudely made antler rods with the distal ends whittled to a flat point; these may have been used as marline spikes, but are not of the same type as the one illustrated.

Bone pins: 2 specimens

Two long and very slender bone pins, 140 and 170 mm in length, have sharply pointed distal ends. The proximal end of one specimen (Plate XV, fig. l) is bifurcated into two sharp spreading points of unequal length. The proximal end of the other (Plate XV, fig. m) is slightly expanded bilaterally and is serrated along one edge. Jenness (1946: 132) states that the Copper Eskimo used artifacts of this type for closing the caribou stomach after blood had been collected in it. The proximal ends were shaped in various ways, but the bifurcate prong type was popular among the groups which he studied.

Wooden plugs: 3 specimens

Two conical wooden plugs, 115 and 125 mm long, taper to a sharp distal point. One specimen (Plate XIV, fig. o) is broken proximally at an annular groove, while the other has two grooves 15 mm apart and a blunt proximal end. A third plug is only 55 mm long, has a blunt distal point, and no proximal grooves. These specimens may have been used as plugs to close the caribou stomach blood bag, as described by Jenness (1946: 132, Fig. 169).

C. *Fishing Equipment*

Fish spear centre prongs: 13 specimens

Only one of the 13 specimens found is complete: it is an antler shaft 185 mm long with roughly rectangular cross-section, bilateral barbs which have been cut off, a small iron end blade held in place by an iron rivet, and a wedge-shaped butt (Plate XVI, fig. d). The remaining 12 fragments are all made of antler, appear to be somewhat smaller, have bilateral barbs and lack end blade sockets (Plate XV, figs. a, b). The lateral barbs are small and have flat undersides or are slightly undercut; on five specimens the barbs are in opposed pairs, while on five others they are placed alternately. Barbed centre prongs without end blades are characteristic of the fish spears collected by Jenness (1946: Fig. 134) from historic Copper Eskimo.

Fish spear side prongs: 4 specimens

Jenness (1946: 111) collected two types of fish spear from the Copper Eskimo. The first, which he called the trident, is represented at the Kunana site by two specimens. The one complete specimen (Plate XVI, fig. e) is an antler shaft 194 mm in length with a sharp distal point and two undercut barbs on the concave side near the distal end; the base is cut obliquely in a long scarf face and is opposed by a proximal lip designed to contain lashing. The second fragmentary specimen appears to have been of the same type but was made from two pieces of antler held together with iron rivets. The leister type of fish spear is also represented by two specimens. One (Plate XVI, fig. c) is a thick antler shaft 98 mm in length with a long scarf face on the exterior side and two iron rivets for attachment to the shaft of the side prong; the head is slightly expanded and contains a heavy barb of beaten iron. The second specimen is 105 mm long; the barb is missing but was set into a slot which was closed and reinforced by three iron nails. These distal ends from composite leister prongs are identical to those described by Jenness (1946: Fig. 134*b*) and Stefansson (1919: Fig. 27).

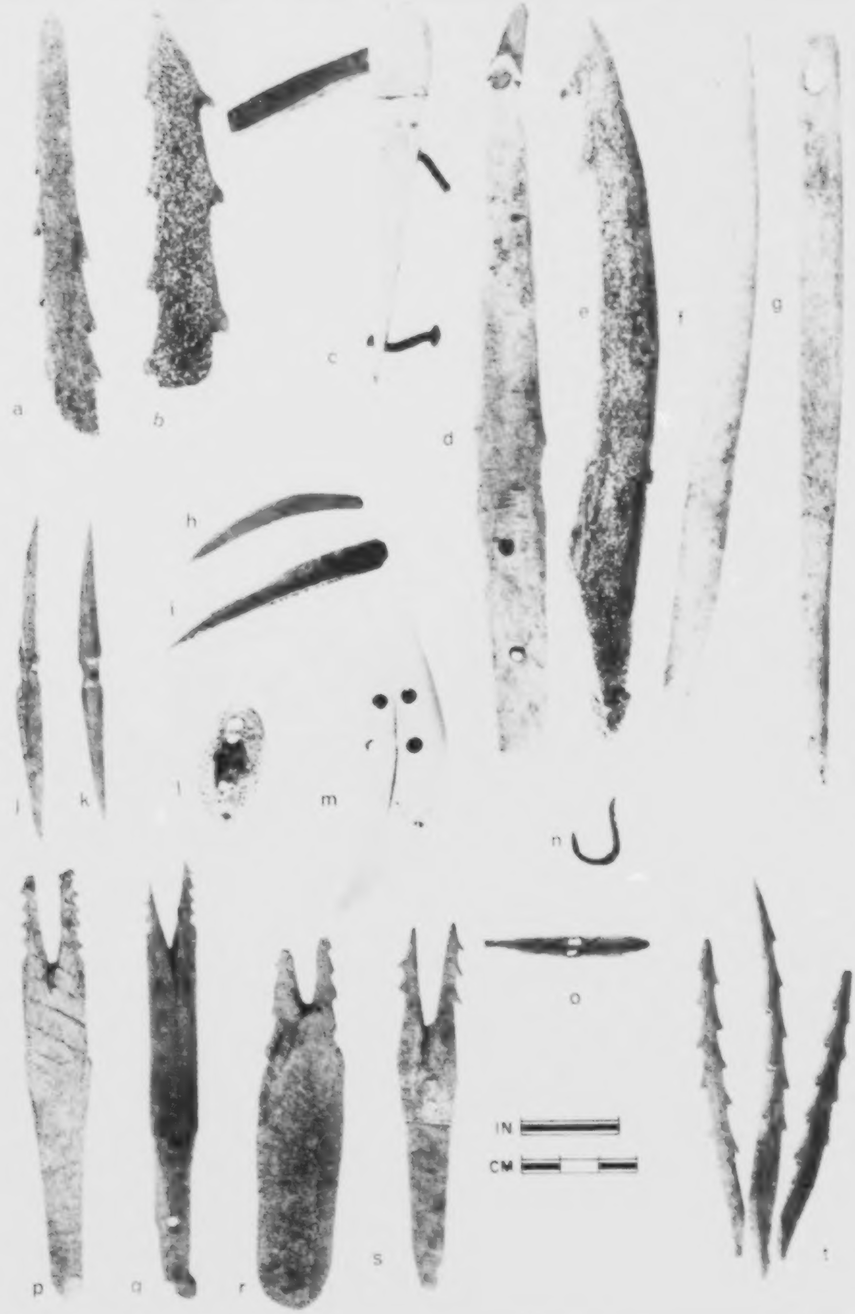
Fish spear barbs: 2 specimens

Two curved antler barbs (Plate XVI, fig. h,i) are 49 and 63 mm long. One end is tapered to a sharp point, and the other is squared for insertion into a square socket such as that found on the leister side prongs. Jenness (1946: 111) states that Copper Eskimo fish spear barbs were invariably of copper or iron; Stefansson (1919: 84) states that barbs were typically of copper. Antler barbs are not mentioned in the ethnographic descriptions.

Sculpin spears (?): 8 specimens

Eight specimens represent a type of bipointed object which may be some type of toy fish spear (Plate XVI, figs. p-s). All are made of antler, are 72 to 130 mm in length, and have one end divided into two prongs with a series of small barbs cut into the outer edge of each prong. Cross-sections vary

Plate XVI
Kunana Site: Fishing Equipment
a. Fish spear centre prong fragment
b. Fish spear centre prong fragment
c. Leister side prong with iron barb
d. Fish spear centre prong with iron end blade
e. Trident side prong
f. Fish needle
g. Fish needle
h. Leister barb, antler
i. Leister barb, antler
j. Fish gorge
k. Fish gorge
l. Fish-hook sinker
m. Fish lure
n. Copper fish-hook
o. Fish lure
p. Sculpin spear (?)
q. Sculpin spear (?)
r. Sculpin spear (?)
s. Sculpin spear (?)
t. Toy fish spear prongs


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
t
IN
CM

from flat to oval; proximal ends are scarfed, pegged, rounded or tanged for insertion into a shaft. Jenness (1946: 111) reports that double pointed spears were sometimes improvised for stabbing sculpins and other small fish. The specimens found at the Kunana site may have been used in the same way and are tentatively labelled sculpin spears.

Toy fish spear prongs: 3 specimens

Three small antler shafts, 85 to 107 mm in length, each have five pairs of alternately placed bilateral barbs and a scarfed base (Plate XVI, fig. t). These specimens, which resemble the trident side prongs described earlier, may be toys modelled on that type.

Fish needles: 25 specimens

Only five of the specimens found are complete: they range in length from 99 to 203 mm and are made from angular splinters of caribou long bone (Plate XVI, figs. f,g). Distal ends are either tapered to a sharp conical point (11 specimens) or ground in facets to a sharp flat point (six specimens). Proximal ends are widened to a flange which contains either a small drilled hole or a large gouged hole. These are identical to the fish needles described by Jenness (1946: 110-11), used by the Copper Eskimo for stringing char caught by spearing at a fish weir.

Fish needle toggles: 3 specimens

Three sections of split antler tine have flat ends and a crude groove cut around the middle. Similar toggles illustrated by Jenness (1946: Fig. 133) were attached to the end of the line which passed through the eye of a fish needle; their purpose was to prevent fish from slipping off the end of the line.

Fish gorges: 2 specimens

Two slivers of bone (Plate XVI, figs. j,k) may be identified as double pointed fish gorges. They are 80 and 88 mm in length, circular in cross-section tapering to a sharp point at either end, and have a central groove for attachment of a line. Double pointed fish gorges have not been reported from the Copper Eskimo.

Fish-hook sinker: 1 specimen

An oval button of ivory (Plate XVI, fig. l), 33 mm long and 18 mm wide, is flat on one surface while the other is convex, decorated with small dots, and has a projection at one end. This specimen is reworked from a Thule culture *tingmiujag*, or bird figure. There are five holes through the mid-line; one large gouged oblique hole shows traces of copper oxide, and was probably the seat for a copper hook, which was riveted to the sinker through one or two of the drilled holes. The suspension line would have passed through the upper drilled hole, while two small bone splinters found with the sinker, which were used as lures, were attached to the lower projection. This is a variant of the Copper Eskimo type of fish-hook sinker described by Jenness (1946: 106-107).

Fish lures: 2 specimens

A polar bear canine tooth with five laterally drilled holes (Plate XVI, fig. m) is identical to a Copper Eskimo fish lure illustrated by Jenness (1946: Fig. 131). A small carved fish of bone, with drilled eye and two gouged holes through the body for suspension, may have also been a fish lure although Jenness (1946: 110) states that the Copper Eskimo never used carved fish as lures.

Fish-hook: 1 specimen

A small copper hook (Plate XVI, fig. n) was found near a grave ring across the river from the Kunana site. The shaft has a rectangular cross-section and the characteristic double curve seen in the Copper Eskimo fish-hooks illustrated by Jenness (1946: Figs. 125, 126, 129).

Ice chisel (?): 1 specimen

A rectangular bar of beaten copper is 70 mm long, 15 mm wide and 10 mm thick. One end is wedge-shaped and the other is broken (Plate XIV, fig. n). This is possibly a fragment of an ice chisel such as those used by the Copper Eskimo to cut holes in the ice for fishing or for obtaining drinking water (Jenness 1946: 113).

D. *Transportation Equipment*

Dog harness toggle: 2 specimens

A flat rectangular antler plaque (Plate XIX, fig. n) measuring 47 by 29 mm has a large hole drilled through the centre and a smaller hole through each corner. An antler pin 100 mm long has an expanded head at one end and a large hole gouged through the other (Plate XIX, fig. o). These are component parts of the type of trace toggle described from historic Copper Eskimo collections by Jenness (1946: 138, Fig. 178) and Birket-Smith (1945: 184). The two specimens do not fit together and represent two different toggles.

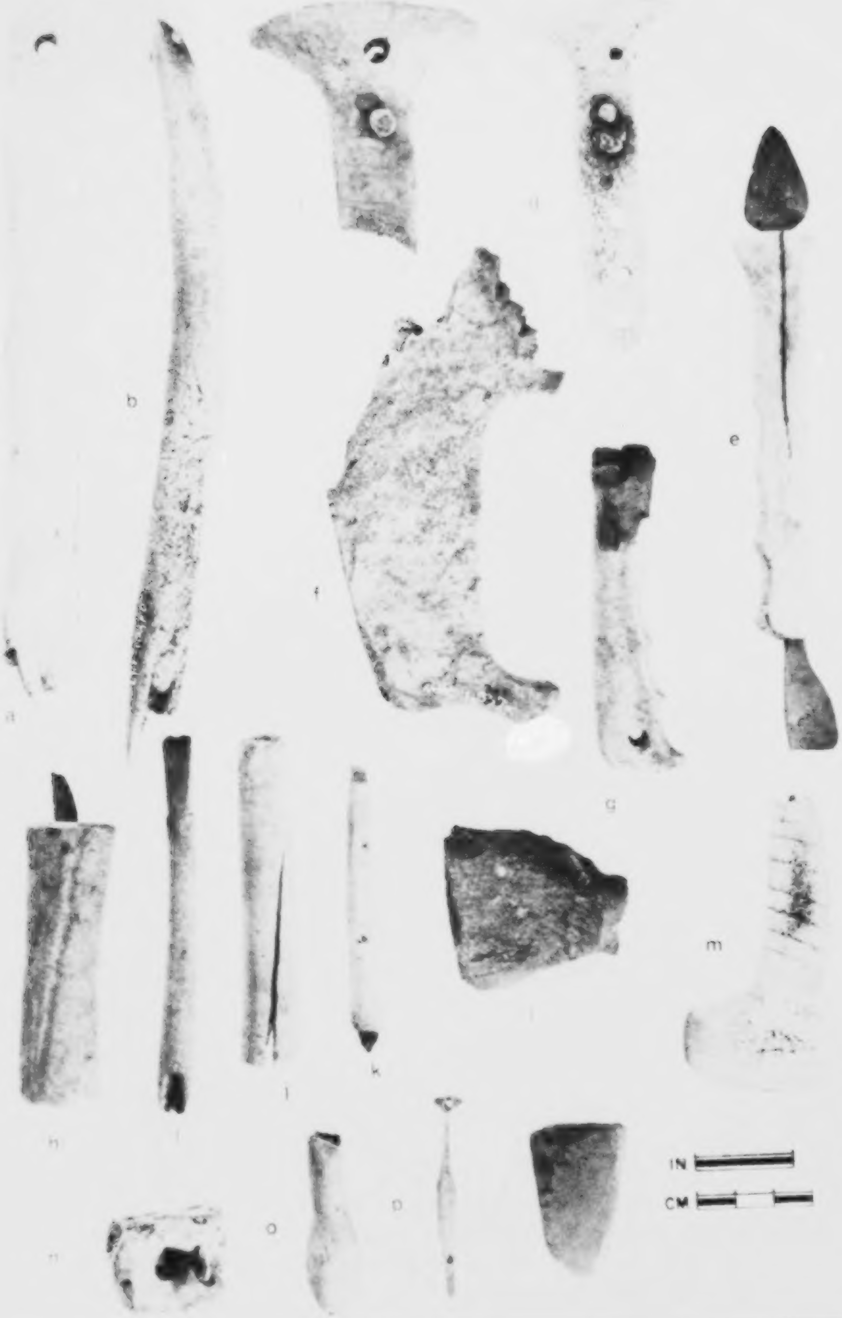
Sled shoe: 1 specimen

A fragment of antler plate 3 mm thick is pierced by four drilled holes, one of which contains a bone rivet. The cortical surface of the antler is polished and has deep longitudinal grooves; the size of the specimen suggests that it was used as shoeing on a small sled. Jenness (1946: 136) states that he saw one Copper Eskimo sled with whale bone shoeing, but that the great majority used only mud shoeing.

E. *Men's Tools*

Knife handles: 20 specimens

Three specimens are the proximal ends of men's knife handles of the standard Copper Eskimo type (Plate XVII, figs. c,d). Made of antler, they consist of a shaft section that is obliquely scarfed and rivetted to the distal part of the handle, and a butt section that is smoothly expanded bilaterally to a width of 39 to 60 mm. A small drilled hole in the butt served to attach sealskin or willow root thong used for whipping the handle. Blades of copper or iron were inserted into the distal ends of the handles, and the knives were used as snowknives, skinning knives, weapons and for miscellaneous purposes (Jenness 1946: 97-98; Stefansson 1919: Figs. 47-49). Four other specimens are the butt ends of knife handles of a similar type except that they are more crudely made and expanded unilaterally instead of bilaterally (Plate XVII, fig. m); this is a variant on the type of knife handle described previously (Jenness 1946: Figs. 109*a*, 110*c*). Six specimens are split fragments of antler shafts with end blade sockets designed for insertion of a tanged blade. These are probably distal sections from composite knife handles of the type described above. Four others are fragments of similar handles except that the tang type of socket is replaced by an open-sided slot; the largest of these (Plate XVII, fig. a) is over 180 mm long with oval cross-section. This type of knife was also collected from the historic Copper Eskimo (Jenness 1946: Fig. 110).


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
IN
CM

Three specimens represent a different type of knife. The largest (Plate XVII, fig. b) is an antler tine fragment over 200 mm long, tapered toward the distal end where a small crescentic notch has been cut out of one edge; iron oxide stains suggest that a small iron side blade had been seated in this notch and secured by a copper rivet, which is still in place. The two other side bladed knives are smaller and more crudely made. These resemble the Copper Eskimo whittling knives described by Jenness (1946: 98, 101; Figs. 113-14) and Stefansson (1919: Figs. 50,51).

Grooving tools: 6 specimens

A section of antler tine 72 mm long with oval cross-section 17 mm wide and 21 mm thick has a small blade socket in either end. One socket contains fragments of an iron blade, and the other contains a thin iron blade 13 mm long with one straight lateral edge, one convex edge, and a small projection at the distal end (Plate XVII, fig. h). Three other specimens, only one of which still contains an iron blade, are of the same type of tool, used as a burin by the Copper Eskimo for cutting grooves in antler, bone and horn (Jenness 1946: 101, Fig. 115). A much more finely made specimen (Plate XVII, fig. e) combines the functions of a whittling knife and grooving tool; the handle is of antler with three finger grooves near one end, and blade sockets in either end contain a tanged lanceolate copper blade, probably used as a knife, and a tanged copper blade of the type seen in the grooving tools described above. A second fragmentary specimen (Plate XVII, fig. g) has finger grooves, a slight unilateral expansion of the butt, drilled suspension hole, and the distal end may have contained a blade for grooving or whittling.

Plate XVII
Kunana Site: Men's Tools
a Knife handle fragment with end blade socket
b Knife handle with side blade socket
c Knife handle butt
d Knife handle butt
e Composite whittling knife and grooving tool, copper blades
f Snow knife handle (?)
g Knife handle fragment
h Grooving tool, iron blade
i Drill foreshaft
j Drill spindle
k Drill foreshaft
l Ground stone adze blade fragment
m Knife handle butt
n Bow drill socket
o Snow probe tip
p Engraving tool
q Whetstone

Engraving tool (toy?): 1 specimen

One small artifact (Plate XVII, fig. p) appears to be a model of the men's knife described earlier. The handle is of antler, 43 mm in length, with expanded butt and suspension hole. The blade is of native copper, 10 mm long and neatly ground to a sharp cutting edge 2 mm wide. This artifact may have been used as a small engraving tool, or it might just be a toy knife.

Whetstone: 1 specimen

A small tabular slab of green slate measures 40 by 25 mm by 7 mm thick (Plate XVII, fig. q); both flat surfaces are ground smooth, and the edges are lightly ground. Jenness (1946: 83) described Copper Eskimo whetstones made from sandstone and used for sharpening iron and copper blades.

Adze blade: 1 specimen

A small angular fragment of ground slate measuring 45 by 45 mm by 8 mm thick (Plate XVII, fig. l) appears to be broken from a small adze blade. The artifact is chipped to shape, both surfaces are lightly ground, and the bit is ground in two asymmetric edge facets which meet at an angle of approximately 80°. Stone adze blades were not collected from historic Copper Eskimo.

Drill mouthpiece: 1 specimen

The socket of a caribou astragalus has been deepened and highly polished through wear, and a bone peg has been driven through two drilled holes on one edge of the socket to raise the level of the rim at that side (Plate XVII, fig. n). The base of the socket is stained with copper oxide, suggesting the use of a copper bearing. This specimen is identical to the Copper Eskimo type of bow drill mouthpiece described by Jenness (1946: 101-102, Fig. 118).

Drill spindle (?): 1 specimen

A cylindrical antler shaft 85 mm long and 14 mm in diameter has a flat proximal end and a deep socket 8 mm in diameter in the distal end (Plate XVII, fig. j); the socket contains traces of iron oxide. This may be the distal end of a bow drill spindle of the Copper Eskimo type illustrated by Stefansson (1919: Fig. 52).

Bow drill foreshafts: 3 specimens

A thin antler shaft 98 mm long has a wedge-shaped proximal tang, and square end blade socket in the distal end (Plate XVII, fig. i). A more crudely made specimen (Plate XVII, fig. k) 70 mm long has a scarfed tang, and the end blade socket contains a small pointed iron blade. A third specimen is only 43 mm long and has a scarf face extending the length of one side; the end blade socket is again square in shape. Drill foreshafts are not described in the ethnographic collections; the one illustrated by Jenness (1946: Fig. 116) is larger than any of the specimens found at the Kunana site.

Antler pick: 1 specimen

A curved antler tine 245 mm long has an oval cross-section tapering to a sharp distal point. The proximal end has a long lateral scarf face and bone rivet which appears to have attached the tine to a handle. The antler picks described by Jenness (1946: 104-105) were not hafted, and were used by the Copper Eskimo for excavating shooting pits.

Snow knife handle (?): 1 specimen

A fragment of a flat antler object 120 mm long, 50 mm wide and 8 mm thick has one slightly convex lateral edge, and the opposite edge has a deep notch between expanded proximal and distal ends (Plate XVII, fig. f). This may be the handle of an antler snow knife, although the Copper Eskimo specimens described by Jenness (1946: 76) do not have well defined hand grips.

Snow probe: 1 specimen

One fragment of a circular antler shaft with bulbous tip (Plate XVII, fig. o) may be the distal end of a snow probe, used to test the consistency of snow to be used in construction. Although Jenness (1945: 105) states that Copper Eskimo snow probes usually had a separate button on the distal end, two snow probes with simple bulbous tips were found in association with the caribou drive lanes near the Kunana site.

F. *Women's Tools and Household Equipment*

Women's knife handles: 12 specimens

Three complete specimens were found, all of the same type and all equipped with iron blades (Plate XVIII, figs. a,b). These handles are of the tanged or T-shaped type, with a stem section which attaches distally to the blade, and a grip section into which the stem fits proximally. The larger specimen has a stem 75 mm in length, a plano-convex grip section with maximum dimensions 18 by 75 mm by 14 mm thick, and a thin blade of sheet iron with a cutting edge approximately 100 mm long. Two smaller specimens are more lightly made and have blades 45 to 50 mm in length; a small hole drilled through the corner of the grip on one of these specimens was probably used for attachment of a sharpening tool. Two additional stem fragments and four grip sections of the same type of handle were found. These handles are of the standard Copper Eskimo type described by Jenness (1946: 80-83); the larger specimen is probably an *ulo* used for cutting meat, and the smaller specimens are *qimalit,* used for cutting and trimming skins. Two other grip sections have very small stem sockets that do not extend completely through the grip; they may have been used to haft tanged copper blades similar to one found near a grave-ring across the river from the Kunana site (Plate XVIII, fig. d). The final specimen (Plate XVIII, fig. c) is a thin trapezoidal plate of antler with a blade slot approximately 80 mm long along one edge, and the other edge thinned for hafting into the handle of a women's knife; three drilled holes along the long axis were apparently used for lashing this intermediate piece to the handle. There are no metal stains in the blade socket, and this specimen may have been used with a slate blade; this is a minor Thule culture form that has not been previously reported from the historic Eskimo.

Blades for women's knives: 6 specimens

Five fragments of thin slate blades with sharp edges ground in bilateral facets were found. None is complete enough to allow a reconstruction of form; the slight edge curvature and thin cross-section suggest that they were used as blades of women's knives, which had copper or iron blades during the period of ethnographic description. One copper blade (Plate XVIII, fig. d) was found across the river from the Kunana site, where it seems to have been placed as a grave offering. This specimen, hammered and ground from native copper 2 mm thick, has a slightly curved cutting edge 125 mm long and a tapering tang 50 mm in length, which may have attached directly to a hand grip of a type found at the Kunana site. Jenness (1946: 80) saw only one Copper Eskimo women's knife blade with attached tang.

Knife sharpener: 1 specimen

A thin copper rod 60 mm long is hafted through the centre of a wooden shaft 9 mm in diameter (Plate XVIII, fig. o) so that one end projects approximately 10 mm. This specimen resembles the tools described by Jenness (1946: 83) as attached to knives with copper blades and used for whetting the blade edges; they, however, all had handles of bone or antler instead of wood.

Scissors (?): 2 specimens

Two fragmentary artifacts consist of thin bone strips to one side of which have been rivetted strips of sheet iron (Plate XVIII, fig. m). These are similar to the blades of scissors illustrated by Jenness (1946: Fig. 104) and Stefansson (1919: Fig. 77), which were copies of European scissors used by the Copper Eskimo for cutting hair.

Scraper handle: 1 specimen

One end of a bifurcate antler tine fragment is scarfed, and one edge is flattened. This is probably part of the handle from a skin scraper of the standard Copper Eskimo type, which consists of a small metal blade mounted on the end of a bifurcate antler shaft (Jenness 1946: Figs. 87, 90*a*).

Skin softener: 2 specimens

A caribou scapula has been modified by removing the section anterior to the scapular spine and by cutting across the remaining breadth of the scapula to obtain a straight and reasonably sharp scraping edge about 80 mm long (Plate XVIII, fig. q). This is identical to an artifact described by Jenness (1946: 85), used by the Copper Eskimo for stretching and softening caribou skins. A sheet of metal (Plate XVIII, fig. e), probably cut from a tin can, is slightly curved and may have been used in the same type of operation.

Threading needles: 3 specimens

A bone pin 72 mm in length has a sharp distal point and a bilaterally expanded head (Plate XVIII, fig. j). This is identical to a specimen illustrated by Jenness (1946: Fig. 103), used for threading a cord through holes in skin as in fastening the front of a tent. Two other large needles, 86 mm and 98 mm long, have large proximal eyes (Plate XVIII, figs. k,l) and may have been used in the same way.

Awls: 9 specimens

Nine crudely shaped splinters of bone and antler have sharp points with striations that suggest they were used as awls for punching holes. Jenness (1946: 96) states that the Copper Eskimo used any pointed tool or splinter for punching holes in skins, and that specialized awls were rare.

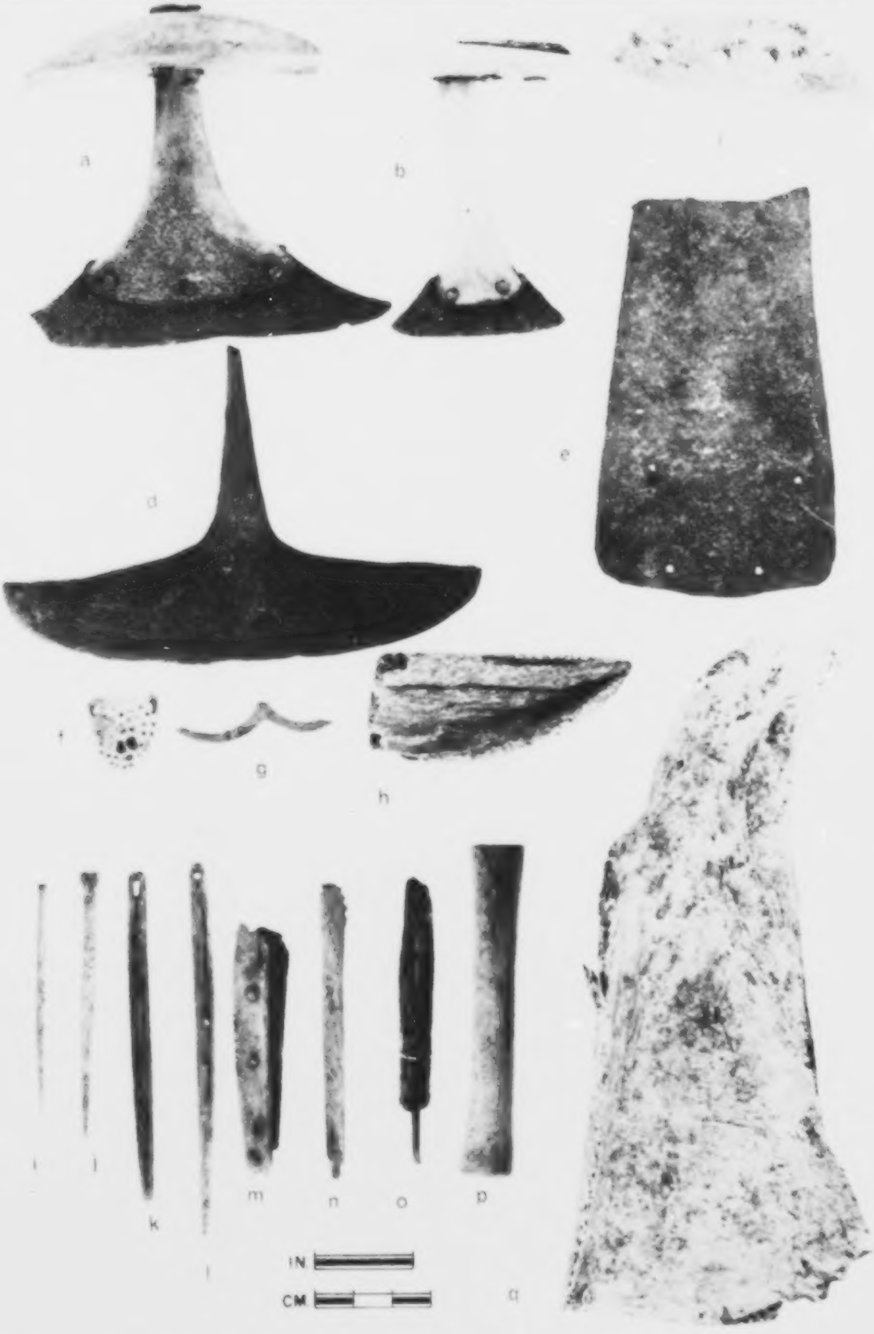
Bone needle: 1 specimen

A fragment from the distal end of a bone needle (Plate XVIII, fig. i) is 62 mm long and has a circular cross-section tapering from a diameter of 2 mm to a sharp distal point. All needles in ethnographic collections from the Copper Eskimo are made of native copper.

Needle cases: 4 specimens

A hollow tubular section of a small long bone 86 mm in length, plano-convex in cross-section, has a smooth undecorated exterior and ends which are cut flat (Plate XVIII, fig. p). A similar but smaller specimen is 55 mm long, and two fragments of similar objects were also found. These are identical to undecorated Copper Eskimo needle cases described by Jenness (1946: 90-91).

Plate XVIII
Kunana Site: Women's Tools
a. Women's knife, iron blade
b. Women's knife, iron blade
c. Women's knife intermediate piece
d. Women's knife blade, copper
e. Skin softener (?), sheet metal
f. Thimble (?)
g. Thimble holder (?)
h. Toy lamp fragment
i. Bone needle fragment
j. Threading needle
k. Threading needle
l. Threading needle
m. Scissors fragment (?)
n. Marrow spatula fragment
o. Knife sharpener
p. Needle case
q. Skin softener


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
IN
CM

Thimble holder (?): 1 specimen

A small incomplete bone object (Plate XVIII, fig. g) appears to be broken from a thimble holder of the double crescent toggle type described by Jenness (1946: 93) but lacks a suspension hole.

Thimble (?): 1 specimen

A small curved plaque of thin antler or bone (Plate XVIII, fig. f) is roughly triangular in shape, 22 mm long and 18 mm wide. The convex outer surface is covered with small pits, and there is a small drilled hole at the base of each lateral edge. The specimen fits nearly over the pad of a fingertip, and the pitting of the outer surface suggests that it may have been used as a thimble; this is a variant of the type described by Jenness (1946: 92-93).

Marrow spatula: 1 specimen

A fragment of a thin bone shaft 75 mm in length has an oval cross-section expanding bilaterally with serrated edges near the distal end (Plate XVIII, fig. n). This is probably the distal end of a spatula, which was generally attached to the needle case and was used for scooping marrow from caribou long bones (Jenness 1946: 95).

Soapstone vessel fragments: 98 specimens

All fragments are from vessels with straight rather than curved sides, but otherwise are too small to permit reconstruction of more than one vessel. This vessel is a rectangular pot with flat base and straight walls 100 mm high; the side walls slant outward at an angle of 10° from the vertical, and the end walls 15°. The end walls are 130 mm wide at the base and 170 mm wide at the top, the side walls 210 mm long at the base and 260 mm long at the top; the walls are 8 to 12 mm thick, and the base 3 mm thick. The lip is flat and undecorated; there is an oblique suspension hole through the side walls at each corner, and a small horizontal ridge along each end 45 to 50 mm below the lip. There is a thick sooty deposit on the exterior base and walls, and a scummy burnt deposit in the interior; a crack has been repaired with large copper staples laced through drilled holes. This specimen is identical in all characteristics to the Copper Eskimo pots described by Jenness (1946: 65-67).

Soapstone lamps: 2 specimens

Two small sherds are parts of a large lamp similar to the type described by Jenness (1946: 60). The side walls are 25 mm high and slant outward at an angle of 20°, the vertical front edge is 20 mm high, and the interior slopes at an angle of 45° to the well of the lamp. The front edge is decorated with two parallel incised lines. Another fragment comprises about half of a toy lamp, with an estimated length of 90 mm and estimated width of 30 mm (Plate XVII, fig. h). Lamps of this type were used as children's toys, for placing on graves, for drying clothes, and for carrying on short journeys (Jenness 1946: 58).

G. *Miscellaneous*

Snow goggles: 1 specimen

A single broken specimen consists of one half of a light pair of antler snow goggles (Plate XIX, fig. f). The outer surface is smoothly convex with no depression in the nasal area, and the interior is deeply concave. The eye slit is narrow and rectangular, 37 mm in length and 1.5 mm wide; two small drilled holes at the outer end served for attachment. This specimen is identical to the Copper Eskimo snow goggles illustrated by Jenness (1946: 43).

Comb: 1 specimen

A slightly broken antler comb is 115 mm long, 28 mm wide at the base of the teeth tapering to 18 mm at the flat butt, and has nine sharply pointed teeth (Plate XIX, fig. a). Decoration consists of a crude "V" of incised lines on one surface, and a series of irregular scratches on the other surface. This specimen is slightly larger and has more teeth than the Copper Eskimo combs described by Jenness (1946: 50-51).

Button: 1 specimen

An oval bone button 32 mm long and 13 mm wide (Plate XIX, fig. h) has one flat surface, the other strongly convex, and two small drilled holes centrally placed on the long axis. Stefansson (1919: 121) states that bone buttons were sometimes worn as charms by Copper Eskimo children.

Pendants: 3 specimens

A small flat pendant of ground slate, oval in outline, has serrated edges and a drilled suspension hole (Plate XIX, fig. i). A caribou incisor has a drilled hole in the root and may have been worn as a pendant. A .256 magnum Gibbs cartridge has a drilled hole through one edge at the distal end (Plate XIX, fig. g); this was found in the turf layer, and may derive from a later occupation. Jenness (1946: 49) states that Copper Eskimo women wore strips of perforated caribou incisors, but that other pendants were usually charms rather than ornaments.

Ajagaq stick: 1 specimen

A bone rod 70 mm long is pointed at one end; the other end has a square cross-section and is grooved so that it fits the thumb and first two fingers of a small hand; there is a small drilled hole near the proximal end (Plate XIX, fig. b). Although the *ajagaq* game was played by the Copper Eskimo, no specialized sticks of this type have been collected.

Antler doll: 1 specimen

A crude doll is made from a flat strip of antler 110 mm long and 23 mm wide (Plate XIX, fig. e). A rounded knob at one end represents the head, a lateral contraction 40 mm below the shoulder represents the end of the arms; clothing is represented by incised lines and seems to indicate a man's outer coat (Jenness 1946: Fig. 5). Only sealskin dolls have been reported from the Copper Eskimo.

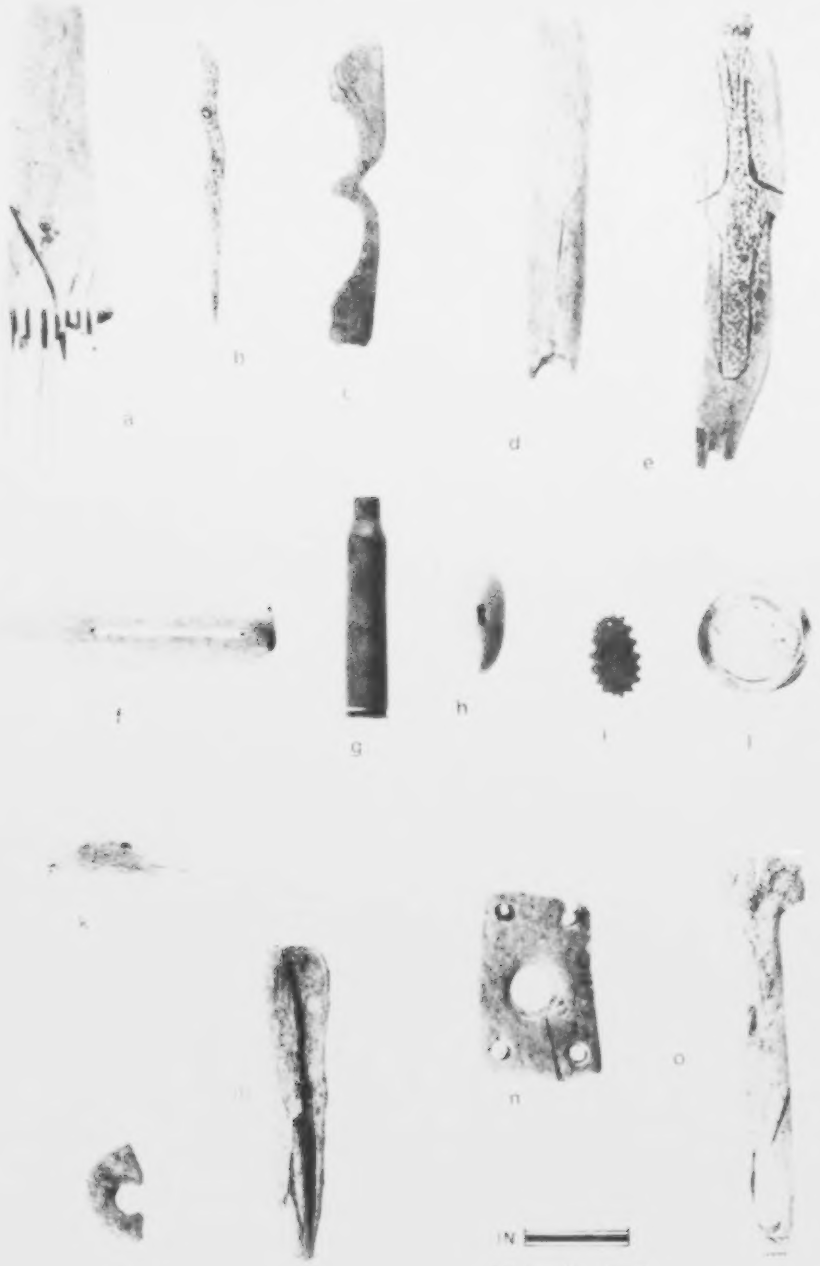
Carved animal head: 1 specimen

A small antler carving is 35 mm long, seems to represent the head of an animal, and is broken at the neck (Plate XIX, fig. k). Two small knobs represent the ears, while the eyes, mouth and nostrils are incised. This may represent a bear or dog.

Glass ornament: 1 specimen

A small circular seal 28 mm in diameter, bearing a motif of the letters "V" and "R" separated by an anchor, has been chipped from a bottle of dark green glass (Plate XIX, fig. j).

Most of the artifacts found at the Kunana site are identical to specimens from ethnographic collections, indicating a close relationship between the occupants of the site and the Copper Eskimo groups described ethnographically during the early


a
b
c
d
e
f
g
h
i
j
k
m
n
o
IN
CM

twentieth century. The most important exception to this generalization is the collection of harpoon heads from the Kunana site, most of which do not even resemble those from ethnographic collections. Most of the varieties found bear a general resemblance to Thule culture forms, as was noted, and the remainder appear to have developed from various Thule types. The great diversity of harpoon head forms found at the Kunana site, which seems to reflect the general lack of standardization in the manufacture of artifacts, may reflect a cultural process that was not active during earlier periods. Most of the other artifacts not reported from ethnographic collections represent manufacturing techniques that had disappeared by the twentieth century; stone end blades, women's knife blades and adze blades, bone fish spear barbs and bone needles, all had metal counterparts by the period of ethnographic description. This evidence suggests an occupation of the Kunana site shortly prior to the twentieth century.

The date of occupation may be estimated more precisely by taking into account the amount and nature of European trade goods found on various parts of the site. A few European items had entered the Copper Eskimo area by the late eighteenth century, probably through trade with Eskimos to the east, and more were brought into the area by the expeditions of Franklin, Richardson, and Simpson during the first half of the nineteenth century. The few metal fragments associated with the triangular tent pits and oval turf rings suggest that these structures were probably occupied during the first half of the nineteenth century.

Plate XIX

Kunana Site: Miscellaneous Artifacts

a Comb
b *Ajagaq* stick
c Unidentified
d Unidentified
e Antler doll
f Snow goggles fragment
g Cartridge case pendant
h Button
i Flat stone pendant
j Glass ornament
k Carved animal head
l Iron fragment
m Iron fragment
n Flat collar of harness swivel
o Harness swivel pin

A great influx of European material took place during the 1850's, with the appearance of the Franklin Search Expeditions of Richardson, Rae, Collinson, and McClure, and especially from the salvaging of McClure's abandoned *Investigator* in northern Banks Island. Stefansson's (1919: 38-39) informants stated that the natives of western Victoria Island soon learned of the abandoned ship and made a trip to the locality, returning with as much iron and other material as they could carry; salvage expeditions continued until approximately 1890 when the ship had been stripped of all useful material. The main occupation of the Kunana site, and the use of the irregular tent pits, probably occurred at this time; approximately 10 per cent of the artifacts found on this part of the site are of European material, and all are consistent with British naval expedition supplies.

Direct trading of steel knives, guns and other material began in 1905 when Captain C. Klengenberg (Jørgensen) wintered in western Victoria Island (Klengenberg 1932: 230), to be followed in 1907 by Captain William Mogg (Stefansson 1919: 198), and trade with northern Athabaskans initiated by Stefansson (1919: 261) in 1910. The Kunana site does not appear to have been heavily occupied during the period of direct trading, although material probably obtained in this manner is associated with the large complex of caches that litter part of the site.

The Kunana site therefore seems to have been occupied primarily during the nineteenth century. At first the site appears to have been occupied sporadically and for short periods of time. There was then a shift to a heavier occupation at a time which may coincide with the appearance of greater amounts of European material during the 1850's; this shift may have been the result of the movement of people through the area in order to plunder the *Investigator*, or perhaps the discovery of the native copper deposits at the head of Kuuk River. The virtual abandonment of the site at the period of direct trading may reflect a change in the seasonal patterns of movement consequent upon the presence of traders or the acquisition of rifles.

The Historic Period in the Copper Eskimo Area

Definition

The Historic period may be defined so as to include all groups of Eskimo who have been mentioned, in the accounts of European travellers in the area. This period would begin in the Coppermine River region with Hearne's visit in 1771, and in most of the remaining area during the 1850's when the Franklin Search Expeditions explored much of the central Arctic. The probable occupants of the Kunana site were met on the ice of Prince Albert Sound by a sled party from the *Enterprise* in the spring of 1852 (Collinson 1889: 107). It may be noted that all early travellers who encountered natives in this area described them in a manner that identifies them with the Copper Eskimo described ethnographically during the early twentieth century.

Known Sites

The Kunana site is the only identified and excavated Copper Eskimo site of the Historic period. The distribution of native population throughout the Historic period was probably similar to that described by Jenness (1922: Fig. 2), and as indicated on Figure 11, p. 70.

Culture of the Historic Period Population

The material culture of the historic Copper Eskimo is fairly well represented by the Kunana site assemblage, as well as by the collections described by Jenness (1946), Stefansson (1919), and Rasmussen (Birket-Smith 1945). For purposes of comparison with the earlier periods, one may summarize the general Copper Eskimo patterns of subsistence activities, seasonal movements, and related elements of social organization: This summary is based on the descriptions and analyses of Jenness (1922), Rasmussen (1932) and Damas (1969*a*; 1969*b*).

Jenness (1922: 42) estimated the total Copper Eskimo population at 700 to 800 people in 1914. This population was divided into a number of named local groups, which were vaguely associated with named territories, but which varied greatly in size and had a very fluid and informal membership. The largest population groupings occurred during the winter, from November or December to May, when the Copper Eskimo were engaged in breathing hole sealing to the exclusion of almost all other subsistence activities. At this season the population was grouped into communities or bands of 50 to perhaps 200 people, with an average of approximately 100, living in temporary snow house villages that were moved every few weeks.

Within the winter band community the basic social units were the nuclear families, related by an almost continuous series of primary kinship links, which were bilateral but had a distinct predominance of male ties. Nuclear families formed separate households, and food sharing beyond the nuclear family was based on a system of seal-sharing partnerships that did not necessarily correlate with close kinship relationships. Marriage was kin agamous, and most marriages occurred within the band community. The community as a whole interacted in shamanistic performances, games, dances, and in the periodic movements of the community to a new location.

In May the caribou began migrating north to the Arctic coast and across the ice to Victoria Island, and seals began to appear on top of the spring ice. This was the signal for breaking up the winter band community, and small hunting groups moved from the sea ice to the land to begin hunting caribou and fishing through the ice of frozen lakes. These hunting groups were sometimes composed of a single nuclear family, sometimes of a few families whose heads were often related through spouse exchange, joking, or dancing partnerships rather than through links of kinship. The relative unimportance of kin directives, and the correspondingly great importance of various types of partnership, were characteristic of Copper Eskimo social organization. The dispersion of the population into small hunting groups continued throughout the summer, during which time the various groups usually split up or merged while wandering over a large area hunting caribou and muskox, fishing, trading, and obtaining raw materials such as wood, soapstone and copper.

During the late summer or early autumn, larger assemblages were formed by the merging of hunting groups at fish weirs or caribou hunting localities. Communal hunting took place to a limited extent at this time of year, when the autumn migrations of char and caribou were exploited in an attempt to store enough food to last over the early winter season of scarcity. After the fall hunt the population gathered at several coastal localities where they had cached winter equipment and blubber when leaving the sea ice the previous spring. The primary activities at this time were the reparation of winter equipment and the sewing of winter clothing, which they finished before moving out onto the sea ice. The Kunana site was probably occupied at this time of year by a group of a few families who used the site as a base for fishing, caribou hunting, and preparing winter clothing while waiting for the formation of sea ice. As soon as the sea ice became solid enough to permit safe travel and occupation (usually in November or December) the various groups moved out to sea and merged into winter band communities engaged in sealing through the ice.

Chapter IV Continuity and Change

This chapter compares the three archaeological periods described above, in order to define the magnitude and direction of changes in the culture of the people occupying the area throughout the archaeological sequence. The factors that may have brought about these changes will be dealt with in the following chapter.

Structures

The structures built by the occupants of the area may be grouped into four classes: caches, caribou drive systems, graves, and dwellings. Caches are known from all three periods and do not change noticeably in form or abundance. A Thule arrowhead was associated with a caribou drive system near Ekalluk River that closely resembles the type of caribou drive used during the Historic period. No caribou drives have been associated with an Intermediate interval occupation, and no sites of the Intermediate type have been recognized at any of the caribou hunting stations used during the Thule and Historic periods. This negative evidence, although very weak, suggests that caribou hunting may have been less important during the Intermediate interval than during the Thule and Historic periods.

No Thule period graves have been recognized in the area, although several stone burial vaults at Taylor's (1967: 223) Ferguson Lake site near Ekalluk River may belong to this period. The Thule people of the area probably placed corpses in heavy stone vaults similar to those used by Thule people in the eastern Arctic (Mathiassen 1927*b*: 130). The four burials found on Intermediate interval sites (three at Tardy, one at OhPo-1) were enclosed in loosely piled vaults of heavy boulders, suggesting that the Thule burial pattern continued even after the Thule period had ended. The historic Copper Eskimo, on the other hand, exposed corpses on the surface of the ground, surrounded by a light stone ring rather than in a vault (Jenness 1922: 174-76).

Vault burial and exposure were seasonal variants of the burial pattern followed by the historic Iglulik Eskimo (Mathiassen 1927*b*: 130). A similar dual pattern may have been followed by the Thule and Intermediate people, since in many areas the construction of stone vaults would have been extremely difficult if not impossible during the winter season. The stone vaults assumed to be typical of Thule and Intermediate burials may be typical only of summer burials, since corpses exposed during the winter would not have been preserved to the present time. Merbs (n.d.) has also proposed this hypothesis on the basis of grave orientation data from the Thule site of Naujan and the Intermediate site of Silimiut on the west coast of Hudson Bay. If this is so, the change from vault burial to exposure during the Historic period may simply reflect another example of stylistic simplification, perhaps encouraged by a longer season spent on the sea ice.

The most dramatic changes occurred in the style and location of dwelling structures, especially those assumed to have been occupied during the winter season. Two styles of winter house are known from the Thule period. The first, represented at the Vaughn and Jackson sites at Cape Parry, is a rectangular structure with straight walls built of horizontal logs and a split log floor. The second is the subrectangular to oval house with flagstone floor and platform areas, earth walls, and wood or whale bone roof supports overlaid with a turf roof. This type of house closely resembles Thule culture houses from the eastern Arctic and is found at Memorana and several other Thule sites in the area. This seems to be an adaptation of the rectangular log house to an area where wood was relatively scarce; the difference between whale bone and wood roof supports is probably also due to ecological rather than cultural differences.

The semisubterranean *qarmat* of the Intermediate interval, as seen at the Nichol and Buliard sites and as described by Hearne, is probably an adaptation of the Thule winter house to a shorter season of occupation during which a skin roof would provide sufficient protection against autumn weather. This interpretation agrees with that of Mathiassen (1927*b*: 134), who suggests that the Iglulik *qarmat* developed from the Thule winter house. Semisubterranean structures were not described by nineteenth or twentieth century observers of the Copper Eskimo, nor are they known archaeologically from this period. It seems possible, however, that the autumn "tent pits" of the Kunana site are vestiges of the *qarmat* pits of the earlier period.

The snow house, the predominant winter dwelling of the historic Copper Eskimo, obviously cannot be traced archaeologically with any degree of accuracy. The discovery of a single snow knife fragment at the Jackson site (Taylor n.d.) suggests that this type of dwelling was known in the area during the Thule period. The absence of snow construction tools at all other Thule sites in the area suggests, however, that the snow house was rarely used. The scarcity of dog sledding equipment at all Thule sites in the area is another indication that winter dwellings were primarily located on the land rather than on the sea ice as in the Historic period. The absence of winter houses at sites assigned to the Intermediate interval strongly suggests that the prevalent type of dwelling at this time was the snow house located on the sea ice.

Summer or autumn dwellings of the Thule period are represented by the heavy stone tent rings found at the Clare and Pembroke sites (Taylor n.d.), as well as by the large stone houses at the Bloody Falls site, which seem to approach the *qarmat* type of dwelling. The tent rings of the Tardy site and other sites considered to have been occupied during the Intermediate interval are similar to those of the Thule period, except for the addition of a line of stones across the shorter axis of the ring. This stone line may represent the edge of the "platform" area, as it does in the historic Iglulik tent rings described by Mathiassen (1928: 133). The appearance of similar structures in northeastern Greenland, which are tentatively assigned to the same time horizon (Bandi and Meldgaard 1952: 60-64), as well as at lower elevations than Thule material near Naujan on Melville Peninsula (Mathiassen 1927*a*: Figs. 21-22), suggests that the addition of a stone "platform edge" may have been due to a widespread stylistic change that took place at this time.

The tent rings used during the Historic period are characterized by small stones which are not placed as closely together as were the boulders used in earlier tent rings. Stone platform edges are not mentioned ethnographically and were not observed on the few Historic period tent rings examined archaeologically; on the other hand, modern Copper Eskimo children at the settlement of Holman build play tent rings with a dividing line of pebbles. The shift from the heavy and continuous tent rings of earlier times to the light tent rings of the Historic period is difficult to explain, but might be related to a change in tent covering material. The conical tent, a form used rarely by the historic Copper Eskimo (Jenness 1922: 80), may have been an efficient adaptation of the more common ridge tent to an area which supplied an abundance of wooden tent poles. On distributional grounds, Mathiassen (1927*b*: 128-29) argues that this was probably a Thule form.

In summary, no totally new type of structure appeared during the Thule to Historic sequence in the Copper Eskimo area. Through a change in function, the Thule winter house degenerated into the *qarmat* of the Intermediate interval, which in turn disappeared during the Historic period. Conversely, the snow house became more important after the Thule period and was the most important winter dwelling in Historic times. Changes in summer tents as represented archaeologically may have been due to stylistic changes and to changes in tent covering material, although this cannot be documented at the present time.

Artifacts

The paucity of artifacts from sites assigned to the Intermediate interval limits this discussion to a comparison of artifacts characteristic of the Thule and Historic periods. The comparison will be made in terms of four sets of artifact classes: (1) those that were present during the Thule period but disappeared prior to the Historic period, (2) those that register an important change in form between the two periods, (3) those that appeared for the first time during the Historic period, and (4) those that persisted unchanged throughout the archaeological sequence. The list of Thule artifacts is amended from that of Mathiassen (1927*b*: 158-62). The list of Historic artifacts is based on the Kunana site collection, and on ethnographic collections from the Copper Eskimo.

Class 1: Thule Period Only

The following artifact classes make up the first set, those that were in use during the Thule period but have not been reported from Historic assemblages:

- Sea hunting
  - whaling harpoon head
  - loose lance head
  - bladder dart
  - harpoon arrowhead
  - tubular harpoon foreshaft socket
  - loose foreshaft
  - harpoon line tension piece
  - flint end blade
  - sealing stool
  - seal scratcher
- Land hunting
  - bird dart
  - throwing board
  - bola
  - bird harpoon head
  - gull hook with oblique barb
  - baleen wolf killer
  - baleen bow
- Transportation
  - *umiak*
  - trace buckle with perpendicular holes
- Men's tools
  - knife with double side blades

- hand drill
- flint flaker
- baleen shave
- whale bone mattock
- walrus penis club
- wooden handle (function unknown)

Women's tools

- beak-handled scraper
- stone scraper blade
- cup-shaped fat scraper
- winged needle case
- anchor-shaped thimble holder
- baleen platform mat
- pottery

Miscellaneous

- stone bead
- ivory bead and pendant
- ornamental ivory chain
- hatched line motifs
- realistic motifs
- owner's marks
- amulet box
- toy (?) baleen knife and end blade

Most of these artifact classes have not been found on Thule sites in the area under study; although they may never have been used during the Thule period in this area, it is more appropriate to assume for present purposes that their absence is due to archaeological sampling error. The list of 41 elements presented above is much shorter than that used by Mathiassen (1927*b*: 160-61) to demonstrate the difference between Thule and Historic cultures. The discrepancy arises through the transfer of several elements from Mathiassen's list to our second set, which will be discussed later.

The disappearance of some of the artifact classes listed above represents major shifts in subsistence patterns. The cessation of large sea mammal hunting is reflected in the disappearance of the whaling harpoon head, the *umiak*, the loose lance head similar to that used by the historic Iglulik and western Alaskan Eskimos for hunting walrus (Mathiassen 1928: 47-48; Nelson 1899: 147), subsidiary tools such as the whale bone shave, and several artifacts made from the bone, baleen and ivory of large sea mammals. The decline of *kayak* hunting is reflected in the disappearance of the bladder dart, the tubular socket piece that was probably used with the bladder dart (Mathiassen 1927*b*: 34), and the harpoon line tension piece and short moveable foreshaft, which were more suited to a throwing than a thrusting harpoon of the type used by the historic Copper Eskimo.

The disappearance of the seal scratcher may reflect a decline in *utoq* sealing (stalking dozing seals on top of the spring ice); this technique was used only rarely during the Historic period prior to the introduction of rifles (Stefansson 1919: 54). A decline in the importance of bird hunting is suggested by the disappearance of the bird dart, throwing board, bolas, and the bird harpoon or loose arrowhead which Mathiassen (1927*a*: 37) suggested were used by the Thule people to hunt waterfowl. Bird hunting was unimportant to the historic Copper Eskimo (Jenness 1922: 105).

The disappearance of the heavy whale bone mattock reflects both a shift in available material and the disappearance of the large semisubterranean winter house. The light antler moss spade of the Historic period was used only for scooping shallow hunting pits, and for obtaining mud sled shoeing (Jenness 1946: 104-105).

Other changes reflect the decline of older manufacturing techniques, which were superseded by more efficient materials and methods. Thus chipped flint end blades were replaced by ones of metal or ground slate, poor pottery was replaced by more durable soapstone vessels, and the hand drill gave way to the bow drill. As can be seen from the Memorana and Bloody Falls site assemblages, these changes were taking place during the Thule period itself. A secondary result of this process is seen in the disappearance of older forms of knife and scraper handles, while those of the Historic period were generally adapted to the use of metal blades.

Most of the remaining element losses can be accounted for by stylistic changes, with the succeeding styles usually reflecting a process of simplification. Thus the wooden sealing stool of the Thule period was replaced by a block of snow cut for the purpose (Rasmussen 1932: 102). The complex Thule forms of gull hook, trace buckle, fat scraper, needle case and thimble holder disappeared, whereas the simpler Thule forms of the same functional classes (straight gorge, trace buckle with parallel holes, sharp fat scraper, cylindrical needle case, toggle thimble holder) continued to the Historic period. The wooden "amulet box" disappeared, but the use of amulets continued (Stefansson 1919: 121). The realistic and hatched line motifs disappeared from decoration, whereas the circle-and-dot and "Y" motifs continued to the Historic period (Jenness 1946: 145). The disappearance of owner's marks, a rare element in Canadian Thule culture, may also have been due to a simple change in style.

Class 2: Change between Thule and Historic Periods

The second set of artifact classes includes those which continued from the Thule to the Historic period, but which underwent a more or less marked change in formal attributes:

- Sea hunting
  - harpoon head, Thule type 1
  - harpoon head, Thule type 2
  - harpoon head, Thule type 3
  - harpoon socket piece with oblique tang
  - drag line toggle
- Land hunting
  - arrowhead tang forms
- Fishing
  - fish spear
  - fish-hook
- Transportation
  - sled shoe
- Men's tools
  - snow knife
  - flensing knife
  - adze
- Women's tools
  - women's knife
  - scraper handle
  - soapstone pot
  - soapstone lamp
  - comb
  - boot

The amount of change evident in many of these elements was considered by Mathiassen (1927*b*: 160-61) to be sufficient to postulate that the Historic period forms did not develop from those of the Thule period. This hypothesis does not seem to be valid for most of the elements examined below.

Thule 1 harpoon head

This harpoon head type was not known from the Historic period until six specimens appeared in the Kunana site assemblage (Plate XIII, figs. a-e). These specimens differ from those of the Thule period in that they are somewhat thinner dorso-ventrally, have the line hole offset toward the lateral edge opposite to the basal spur, and have a bone peg set into the distal end of the socket. The offset line hole is a feature of other Kunana site harpoon heads, and may be considered as a technical improvement in that it would facilitate toggling by increasing the moment between line hole and spur. The peg inserted into the distal end of the socket, presumably as a reinforcement against the thrust of the foreshaft, is also found on a few harpoon heads of the Birnirk stage at Point Barrow (Ford 1959: 82), and at the Canadian Thule sites of Qilalukan (Mathiassen 1927*a*: Plate 39, fig. 4) and Memorana (Plate 1, fig. f). There seems little doubt that the Historic period form developed from that of the Thule period.

Thule 2 harpoon head

This type was not known from the Historic period until the Kunana site excavation. Two specimens from the Kunana site (Plate XII, figs. m,o) differ from the Thule period type in being thicker dorso-ventrally, more crudely made, and having the offset line hole and pegged socket described previously. One specimen (Plate XII, fig. n) has three barbs and is similar to Mathiassen's type AIb3 found at the Thule period site of Qilalukan and considered by Mathiassen (1927*b*: 17-18) to be a degenerate form of the Thule 2 type. Several other specimens from the Kunana site (Plate XII, figs. g-q) are more distantly related to the Thule 2 type but probably developed from Thule culture forms.

Thule 3 harpoon head

The Kunana site produced only one aberrant specimen of this type (Plate XIII, fig. j). Two others (Plate XIII, figs. h,i) are closed socketed forms of Mathiassen's type AIIc1, found at late Thule period sites and considered by Mathiassen (1927*b*: 20) to be a development from the Thule 3 type. This type of harpoon head, with the addition of a bifurcate spur, was the dominant form collected from historic Copper Eskimo by twentieth century ethnographers; Jenness (1946: 116) is probably correct in attributing the bifurcate spur to recent influence from the Hudson Bay area.

Harpoon socket piece

The Kunana site produced several heavy socket pieces with oblique tangs (Plate XIV, figs. a,b), identical to the most characteristic form of the Thule culture. Jenness (1946: 113-14) collected several similar specimens which he identified as sockets for ice chisels; this artifact may have undergone a change in function prior to the Historic period. The type of harpoon socket piece collected by Jenness and represented by a single specimen from the Kunana site (Plate XIV, fig. c) differs from the Thule type only in having a split rather than oblique tang.

Drag line toggle

Mathiassen (1927*b*: 160) claimed that the Thule toggles used for dragging seals over the ice were distinctly different from those of the Historic period. The Copper Eskimo specimens (Plate XIV, fig. m) seem to differ from those of the Thule period only in being somewhat less strongly curved and in being more finely made and decorated. Taylor (n.d.) illustrates a toggle which strongly resembles the Historic period type, and which came from a disturbed part of the Thule period Pembroke site near Cambridge Bay.

Arrowhead tangs

Although the blade sections of Historic period arrowheads generally resemble those of the Thule period, the tang sections are somewhat different. Conical tangs with knobs or opposed spurs are characteristic of the Thule period forms, although a few oblique tangs are found on some Thule sites, and oblique tanged arrowheads were the dominant forms used by the historic Netsilik, Iglulik and Baffin Island Eskimos (Mathiassen 1927*b*: 46). Of 68 arrowhead tangs found at the Kunana site, 36 per cent are conical with opposed spurs, 19 per cent are oblique, and the remaining 45 per cent are wedge-shaped. Both the conical and oblique types of tang are probably derived from Thule culture forms, while Birket-Smith (1945: 162) may be correct in suggesting that the wedge-shaped tang simply combines the attributes of the two primary forms. A wedge-shaped tang was found on the Thule period Bloody Falls site (Plate VI, fig. g), and tangs of a similar type appear on the eighteenth century Ambler Island site on the Kobuk River in northern Alaska (Giddings 1952: 43).

Fish spear

The two forms of Copper Eskimo fish spear, the leister and the trident, are both known from the Thule period, although the leister seems to have been the dominant type (Mathiassen 1927*b*: 56-57). The Copper Eskimo leister differs from that of the Thule period in having a multiple barbed centre prong instead of a straight spike. Birket-Smith (1945: 178-79) again considers the barbed centre prong to be due to an amalgamation of the two types of spear. It should also be noted that some of the barbed centre prongs found on Thule sites may have been used with leisters rather than exclusively with tridents.

Fish-hook

Composite fish-hooks with attached sinkers are known from the Thule period, but do not seem to have been in general use (Mathiassen 1927*b*: 57). This conclusion may have been biased by the fact that most excavated Thule sites are located at coastal sea mammal hunting stations, while fish-hooks were used during the Historic period primarily for fishing at inland lakes (Jenness 1922: 152). The specific form of the Historic period fish-hook with attached sinker (Plate XVI, figs. l,n) is, as Birket-Smith (1929: 68) has pointed out, probably an adaptation of an older form to the use of a metal hook. Copper hooks similar to those of the Historic period were found in Thule period houses at Bloody Falls (Plate VI, figs. j-m).

Sled shoe

The change from whale bone sled shoes in the Thule period to mud shoeing in the Historic period may reflect primarily a change in available materials. It is quite possible that mud shoeing may have been in use during the Thule period; this would account for the absence of whale bone sled shoes from Thule sites in this area. On the other hand, both Jenness (1946: 136) and Stefansson (1919: 79) reported a few Copper Eskimo sleds with whale bone shoeing, indicating that the change had not been complete.

Snow knife

The broad, shouldered snow knife with specialized grip is characteristic of the Thule period; this was replaced by a more slender and less specialized form in the Historic period throughout the central Arctic (Mathiassen 1927*b*: 65-67). This may again reflect a decline in the availability of whale bone, the material most suited to the manufacture of the broad type of snow knife. The Kunana site produced a fragment of a flat antler object (Plate XVII, fig. f) which closely resembles the handle section of a Thule snow knife, and which may have been a derivative of that form. Most snow construction during the Historic period seems to have been done with the multipurpose men's knife with long metal blade (Jenness 1946: 98).

Flensing knife

The multi-purpose men's knife with metal blade and T-shaped expanded butt, characteristic of the Copper Eskimo (Jenness 1946: 97-99) and other central Arctic groups appears to be a direct derivative of the "flensing knife" of the Thule period. The tanged blade of Historic period forms is probably an adaptation to the use of metal; tangs occur on the small copper end blades found at the Thule period Bloody Falls site (Plate VII, figs. a-i), while a few Historic period knives (Plate XVII, fig. a) retained the Thule method of attaching the blade into a slot. Many Thule period flensing knives have a slightly expanded butt (Mathiassen 1927*a*: Plate 17, fig. 6, Plate 46, fig. 5, Plate 83, fig. 2), and a site which is probably prehistoric in the Mackenzie Delta area produced a knife handle which is identical to the historic Copper Eskimo form (MacNeish 1956: Plate 5, fig. 18).

Adze

The adze handles and sockets of the Historic period (Jenness 1946: 102-104) are slightly simplified variants of the Thule forms. The absence of socket pieces on some Historic period specimens is perhaps related to the use of metal blades instead of the stone blades of the Thule period. The Kunana site assemblage includes a fragment of ground stone (Plate XVII, fig. l) which appears to have been an adze blade similar to the type used during the Thule period.

Women's knife

One of the most distinctive differences between Thule and Historic artifact classes is in the form of the women's knife handle. The characteristic T-shaped or "tanged" handle of historic Central Eskimo women's knives has not been found on earlier sites. Mathiassen (1927*b*: 87) has suggested that this type of handle developed from a Thule period form with wide but distinct grip section, through a minor late Thule form with intermediate piece (a specimen of which was found at the Kunana site), to the modern T-shaped form. Mathiassen (1927*b*: 88) further claimed that this development did not occur as an adaptation to the use of metal blades, since a specimen of the historic handle form had been found with a stone blade. The specimen to which Mathiassen refers was described by Boas (1888: 518); the blade of this specimen was missing, and Boas seems to have assumed that it had been of slate since the specimen was from an archaeological site. The T-shaped handle would seem to be well adapted to the use of small metal blades, made from the small fragments of metal which trickled into the central Arctic during the seventeenth to nineteenth centuries. The copper blades found at the Bloody Falls site (Plate VIII, figs. a,c) probably fitted handles of this type. A search for external cultural influences to account for the development of this form would seem to be unnecessary.

Scraper handle

The branched antler scraper handle used by the historic Copper Eskimo (Jenness 1946: Fig. 87) is also probably an adaptation to the use of a small blade. A metal blade could be rivetted directly to the handle, and would not require the thick supporting handle necessary for the attachment of the stone blades used during the Thule period.

Soapstone pot

Mathiassen (1927*b*: 103-105) drew a sharp distinction between the oval and subrectangular cooking pots of the Thule period and the rectangular forms used by the historic Central Eskimo. Although this distinction is generally valid, it should not preclude the possibility that the Historic period form developed from that of the Thule period. Subrectangular Thule pots such as that from Qilalukan (Mathiassen 1927*a*: Fig. 71) would seem to have been the probable ancestral form of the rectangular Copper Eskimo pot with slightly convex sides (Jenness 1946: 65-68). The rectangular soapstone pot found on the Thule period Bloody Falls site would almost pass for a Historic period form; the primary difference is in the presence of lugs on either end, which had developed by the Historic period into a solid moulding.

Soapstone lamp

Mathiassen (1927*b*: 100) distinguished the Thule lamp, with a characteristic ridge of row of knobs near the front edge supposedly designed to support the wick, from the Historic period form characterized by the absence of a wick ledge but with a ridge near the rear of the lamp to separate unmelted blubber from oil. Birket-Smith (1945: 256) has suggested that the only difference between Thule and Historic forms was due to a stylistic change in the placement of the dividing ridge. The semicircular outline and general form of lamps from both periods are very similar, suggesting direct development of the Historic form from that of the Thule period.

Comb

Two types of comb were distinguished by Mathiassen (1927*b*: 113-15). One type, with narrow ornamented handle and suspension hole, was the characteristic Thule form; the other, with broad plain handle and no suspension hole, was characteristic of the Historic period. Although generally unornamented, the handles of historic Copper Eskimo combs are narrow and often have suspension holes (Jenness 1946: Fig. 42; Stefansson 1919: Fig. 83). Except for the general crudeness of manufacture, these combs resemble the Thule type more closely than they do those from the Historic period in the eastern and western Arctic (Boas 1888: Fig. 513; Murdoch 1892: Fig. 98).

Boot

The high sealskin boots of the Thule and Historic periods appear to have been identical except for one detail. On the few Thule period boots known, the ankle cord was passed through two loops of skin sewn along the upper edge of the sole on either side of the foot, while those of the historic Copper Eskimo had one loop on either side of the sole and one loop on the instep (Jenness 1946: Fig. 12). This appears to have been a minor stylistic change which could have taken place quite easily. Modern Copper Eskimo boots again have two loops on each side of the sole, the style having probably been reintroduced from the Mackenzie area.

Class 3: Historic Period Only

All of the changes in material culture elements which have been examined thus far appear to reflect changes in subsistence patterns, the use of different manufacturing materials, and stylistic changes. None of these changes may be interpreted as convincing evidence for a non-Thule component in the material culture of the ancestors of the Copper Eskimo. If such evidence does exist, it should appear in our third set of culture elements, those which are not known from the Thule period but which appear in the material culture of the Copper Eskimo:

- Sea hunting
  - harpoon head Kunana Closed Socket type
  - breathing hole searcher
  - seal indicator
- Land hunting
  - meat skewer
  - blood bag pin
  - blood bag plug
  - blood bag handle
- Fishing
  - fish rake
  - "sculpin spear"
- Transportation
  - flat collar harness swivel
  - bird-shaped *kayak* paddle rest
- Women's tools
  - trapezoidal ladle
  - skin comb
  - scissors
- Miscellaneous
  - ceremonial knife
  - hoop and pole game

An attempt will be made to reconstruct the history of each of these elements of Historic period material culture.

Kunana Closed Socket harpoon head

This relatively simple type of harpoon head is the dominant form in the Kunana site assemblage. It does not closely resemble any Thule type, although a single "toy" specimen was reported from the Thule site of Qilalukan (Mathiassen 1927*a*: Plate 40, fig. 6). Very similar specimens occur in eighteenth-century assemblages from southeast Greenland (Mathiassen 1933: Plate 5, fig. 1; Plate 10, fig. 33), throughout the Nukleet sequence in Norton Sound (Giddings 1964: 38), and a single specimen was reported from a seventeenth- or eighteenth-century house at Uwelen on the Siberian coast (Rudenko 1961: Plate 5, fig. 5). It bears some resemblance to Ford's (1959: 90) Kuk Closed Socket type found at recent sites in the Point Barrow area, but lacks the characteristic triangular cross-section of the Kuk form. Similar specimens were used by the historic Iglulik Eskimo as fish harpoons (Mathiassen 1929: Fig. 39), and Birket-Smith (1945: 180) described two Copper Eskimo specimens which seem to be similar to the Kunana Closed Socket type and which were apparently mounted on the prongs of fish leisters. Some of the Kunana site specimens may have been used in this way, but the large size of others suggests that they were used as sealing harpoons. Although Giddings (1964: 38) suggested that the Nukleet specimens, in contrast to other Nukleet forms, were related to south Alaskan rather than to Thule types, the widespread occurrence of this simple type of harpoon head suggests that it probably developed from the Thule 1 type. This development would have involved the change from open to closed socket and the introduction of an offset line hole and rounder cross-section. In any case, antecedents of this harpoon head form are more likely to be found in Thule culture forms than in those of Dorset or any other Palaeo-Eskimo culture.

Breathing hole searcher

The long antler probe used by the historic Central Eskimo for locating a seal's breathing hole under the snow cover has not been recognized from Thule culture. The characteristic breathing hole searcher of the Copper Eskimo, as illustrated by Stefansson (1919: Fig. 1) and Birket-Smith (1945: Fig. 131) is identical to the snow probe used to test the consistency of snow for house construction. Jenness (1946: 105) states that the snow probe is used as a breathing hole searcher by the Copper Eskimo. The snow probe is a common element of Thule culture (Mathiassen 1927*b*: 67-68), and may have been used secondarily as a breathing hole searcher. The form, if not the function, of the Historic period breathing hole searcher was obviously derived from the Thule culture form. Snow probes or breathing hole searchers have not been recognized from Dorset culture or northern Indian assemblages.

Seal indicator

The two forms of indicator used by the Copper Eskimo to detect the arrival of a seal at the breathing hole (Jenness 1946: 119) have not been identified from Thule culture. The absence of this artifact class from Thule assemblages may be due to preservation factors, since the indicator made of split sinew and down would not have been preserved archaeologically, and the slim bone rod of the second type would be rarely preserved in recognizable form. The absence of this artifact from historic assemblages in Greenland, Labrador, and Alaska west of Point Barrow (Birket-Smith 1945: 250) suggests a central Arctic origin, but the element may have been invented during the Thule period. The seal indicator does not seem to radically increase the efficiency of breathing hole hunting; in fact the Baffin Island Eskimo rarely used the artifact since they felt that it frightened the seals (Boas 1888: 479). Again, no seal indicators are known from Dorset culture assemblages or other prehistoric cultures.

Blood bag

The specialized artifacts (skewers, pins, plugs, handles) connected with the use of a caribou stomach as a container for the blood of the animal (Jenness 1946: 132, Figs. 167-69) are not known from prehistoric assemblages or from ethnological collections from groups other than the Copper Eskimo. This complex was probably a local innovation of relatively recent date, as has been suggested by Birket-Smith (1945: 271). No antecedents for this complex have been recognized in any prehistoric assemblages.

Fish rake

The Copper Eskimo fish rake, a specialized form of gaff used for catching Arctic char at Bloody Falls and a few other localities, was first described by Hearne (1958: 103) who saw it used in 1771. This distinctive artifact has not been reported from any other Historic or prehistoric Eskimo culture. The copper gaff hook found at the Thule period Bloody Falls site (Plate VI, fig. s) may have been used in the same way as the Historic fish rake, and may be the antecedent to that form. The distribution of the gaff among Historic Eskimo groups from Coronation Gulf to Greenland and Labrador (Birket-Smith 1945: 266-67) suggests that it was in common use during the Thule period. Again, the coastal location of most excavated Thule sites has biased the representation of fishing tools in the Thule inventory.

"Sculpin spear"

These small bipointed artifacts are common only in the Kunana site assemblage. VanStone (1962: Plate 10, fig. 16) has illustrated a similar specimen from a nineteenth-century Netsilik site, and Holtved (1944: Plate 13, fig. 24) illustrated a small "leister" from the Early Transitional period of northwestern Greenland, which appears to be very similar to the Kunana site specimens. A "forked arrowhead" from the early Thule site of Naujan closely resembles these specimens, but has a conical tang (Mathiassen 1927*a*: Plate 8, fig. 7). The "sculpin spear" may have developed from a minor Thule culture form which is not well represented archaeologically. No similar artifacts are known from Dorset culture assemblages.

Flat collar harness swivel

This very characteristic Copper Eskimo artifact (Plate XIX, figs. n,o) is not known from any prehistoric assemblages in the area. In the Historic period it is reported from the Copper, Caribou, Polar and East Greenland Eskimo (Birket-Smith 1929: 259) and in Alaska from Norton Sound and the lower Yukon River (Nelson 1899: Plate 76, figs. 6, 8, 12). This evidence suggests that the flat collar harness swivel may have been known to the Thule culture although, as among Historic Eskimo, it was very rarely used (Birket-Smith 1945: 233).

Bird-shaped *kayak* paddle rest

This very minor element, which was mounted on the front deck of the *kayak*, has been variously described as a buckle for holding deck thongs (Birket-Smith 1945: 188) and as a fulcrum against which the double bladed paddle was placed in order to obtain more leverage in paddling (Jenness 1946: 140). This artifact is probably a recent innovation among the Copper and Netsilik Eskimo. Very similar specimens have, however, been collected from the Eskimo of Kotzebue and Norton Sounds (Nelson 1899: 277, Plate 78, fig. 2); the Alaskan specimens were mounted to one side of the *kayak* manhole and were used to support the single bladed paddle when it was not in use.

Trapezoidal ladle

The deep trapezoidal ladle of muskox horn (Jenness 1946: 70-71) is quite distinct from the shallow oval ladles of the Thule culture. The National Museums of Canada have in their collections, however, a deep trapezoidal ladle with short handle of the Historic form, made from whale bone and excavated from the Thule period Debliquy site (QjLe-1) on Bathurst Island in the central Arctic. The ladle of the Historic period may, therefore, have developed from a minor Thule form.

Skin comb

Although mentioned by neither Stefansson nor Jenness, the comb used for cleaning caribou skins may have been an element of Copper Eskimo culture during the early twentieth century (Birket-Smith 1945: 261). This element may have been recently introduced from North Alaska, where it is known archaeologically from Utkiavik, Nuwuk, and the upper levels of the Nunagiak site at Point Barrow (Ford 1959: 208).

Scissors

Scissors of bone or antler with iron cutting edges were collected by the earliest ethnographers in the Copper Eskimo area (Stefansson 1919: Fig. 77; Jenness 1946: Fig. 104). Jenness (1946: 96) was doubtless correct in stating that these were modelled after European scissors obtained by the natives of Hudson Bay in historic times.

Ceremonial knife

This element of the Copper Eskimo dance costume was mentioned only by Birket-Smith (1945: 215-16). This may have been a recent introduction from North Alaska, where it also occurred during the Historic period (Birket-Smith 1945: 225).

Hoop and pole game

This children's game is also considered by Birket-Smith (1945: 271) to have been a recent introduction from the western Arctic.

This set of material culture elements does not reveal convincing evidence of a non-Thule component in Copper Eskimo culture. Some elements may have been derived from minor Thule culture forms, while others appear to have been recently introduced from the western Arctic. Only a few elements seem to be the result of local innovation, and none of these can be traced to a Palaeo-Eskimo or Dorset ancestry. With the possible exception of the Kunana closed socket harpoon head, breathing hole searcher, and fish rake, all of the elements in this list can be classed as "gadgets" which were undoubtedly useful, but which could not have contributed to any basic change in the living patterns of the people who made and used them. The historical and cultural significance of such gadgets may be easily overvalued in distributional studies.

Class 4: Unchanged from Thule to Historic Periods

I have now examined 41 material culture elements that disappeared between the Thule and Historic periods, 16 elements that appeared for the first time in the Historic period, and 18 elements that underwent a more or less marked change in form between the two periods. To these may be added the final set of 85 elements, those which continued relatively unchanged from the Thule to the Historic periods (mainly after Birket-Smith 1945: 220-25).

Sea hunting
- harpoon head, Thule type 4
- harpoon head, Nuwuk Closed Socket type
- fixed harpoon foreshaft
- harpoon finger rest
- wound pin
- seal drag line

Land hunting
- compound bow
- reflex bow
- wrist guard
- lanceolate arrowhead forms
- barbed arrowhead forms
- end bladed arrowhead forms
- blunt arrowhead
- arrow feathering, 2 tangential
- skin quiver
- sinew twister
- marline spike
- feather cutting board
- arrow straightener
- caribou lance
- box trap

Fishing
- fish weir
- fish trap
- single pointed gorge
- double pointed gorge (gull hook?)
- fish decoy
- leister harpoon
- fish needle
- cod jig
- ice chisel
- ice scoop, solid type

Transportation
- simple wooden sled
- skin toboggan (baleen in Thule period)
- fan hitch
- *kayak*
- double bladed paddle

Men's tools
- snow probe
- snow shovel
- snow house
- skin tent
- drinking tube
- fire drill
- crooked knife
- grooving knife
- bow drill
- whetstone
- wedge
- saw
- scarfed attachments
- cold hammering of metal
- soapstone working techniques

Women's tools
- wick trimmer
- blubber pounder
- drying rack
- pot hook
- meat fork
- narrow spoon
- meat tray
- wooden vessel with bent rim
- coiled basketry
- marrow spatula
- scapula scraper
- sharp fat scraper
- urine scraper
- bone needle
- bodkin or threading needle
- thimble
- toggle-shaped thimble holder
- cylindrical needle case
- boot creaser
- cutting board
- snow beater
- coat, 2 skin with long flaps
- sandal boot with median leg seam
- mitten, divided palm

Miscellaneous
- snow goggles, 2 eye slits
- *ajagaq*
- *nuglugaq*
- bull roarer
- doll
- tooth bead
- bird figure
- "Y" ornament
- circle-and-dot ornament
- drum (tambourine)

Thus, of 160 material culture elements compared, at least 104 elements (87 per cent) of the 119 present in the Historic period are probably derived from Thule period forms. This proportion rises to over 90 per cent if we accept the suggestions made earlier with regard to the probable Thule ancestry of the Kunana Closed Socket harpoon head, breathing hole searcher, flat collar harness swivel, fish rake, and trapezoidal ladle. Changes in form may be attributed to stylistic simplification (e.g. needle case, comb, thimble holder, decorative motifs), change of materials (e.g. decreased use of whale bone, ivory and wood; increased use of muskox horn, antler, soapstone, and metal), and to a general decline in the uniformity of artifact classes which is manifested especially in the harpoon heads and arrowheads.

The disappearance of 41 Thule culture elements (28 per cent of the 144 examined) is partly the result of the above-mentioned processes but also reflects changes in hunting and subsistence patterns, primarily the cessation of large sea mammal hunting and the declining importance of bird hunting. To some extent these changes were already occurring in the Thule period as it is known from this area.

The few totally new elements which appeared during the Historic period, accounting for not more than 13 per cent of the elements examined (16 out of 120), are primarily "gadgets" which reflect the ingenuity of the Copper Eskimo but which hardly increased the efficiency of Thule material culture, and represent no major changes in economic activities. There is no evidence to suggest that any of the innovations seen in the historic artifact inventory are due to the influence of non-Thule Eskimo cultures, although recent influence from European and western Arctic Eskimo cultures are evident.

Subsistence and Social Organization

The preceding chapter contained a brief summary of the subsistence and social organization patterns of the historic Copper Eskimo, as well as an attempt to reconstruct comparative patterns from the Thule and Intermediate periods. The inferred changes outlined below are extremely tentative, but seem to be those which best accommodate the array of archaeological evidence now available.

No significant change in the size of the human population of the area under discussion can be detected throughout the archaeological sequence. We may suspect that the areal and seasonal distribution of population varied through time to a greater extent than did the total population size, which may have been stabilized by ecological determinants. The same primary subsistence resources seem to have been utilized in all periods (*see* Taylor 1966), but the emphasis placed on individual resources and the techniques used in the collection and disposal of resources changed through time.

The Thule period population of the area appears to have spent the winter season in small coastal settlements. The basic social unit at this season was the hunting group, which was probably composed of an extended family, and the predominant subsistence activity was sealing. The location of the Memorana site suggests that the occupants depended more heavily on sealing from the ice edge or through tidal cracks than at breathing holes. Sealing was probably supplemented by some winter hunting or caribou, and at some localities caribou killed during the autumn or winter provided the staple winter food. The small hunting group probably remained close to their winter settlement, and very little travel, visiting or trading took place.

This pattern appears to have changed near the end of the Thule period. Although the people of the Intermediate interval spent the early winter in small coastal *qarmat* settlements, the remainder of the winter was probably spent on the sea ice. By analogy with the historic Copper Eskimo, we may infer that the people of the Intermediate interval were primarily engaged in breathing hole sealing during this season, and lived in temporary snow house villages. The large winter communities characteristic of the Historic period probably became established at this time, and there may have been a consequent increase in winter travel and visiting between communities. This pattern continued into the Historic period.

We may assume that the Thule people remained for some time into the spring at their coastal winter settlements, sealing on the spring ice or from *kayaks* in open water. The absence of recognized Thule summer sites in coastal areas suggests that much of this season was spent in the interior, hunting caribou and fishing, with the small hunting group as the maximum social unit. Summer whaling was important to groups living to the west of Cape Parry, but probably not to the people who occupied the area inhabited by the historic Copper Eskimo. The Intermediate interval population seems to have followed a similar pattern. The large coastal tent ring settlements assigned to this period were probably occupied during the spring and early summer while the people were engaged in sealing through the spring ice or in *utoq* hunting of seals on top of the ice. The remainder of the summer must have been passed in the interior of the country.

The historic Copper Eskimo seem to have slightly changed this pattern by not engaging in spring sealing. As soon as seals began to appear on top of the spring ice the Copper Eskimo moved to the land, cached their winter equipment on the coast, and proceeded immediately into the interior (Stefansson 1919: 54; Jenness 1922: 120). Among the early twentieth century Copper Eskimo it was only the older men who knew the techniques of *utoq* sealing (Stefansson 1913: 208), and this method was rarely used until after the introduction of rifles. The remainder of the summer was spent as it was during the preceding periods, hunting and fishing in the interior, and wandering in small groups composed of a single nuclear family or a few families joined by ties of kinship or partnership.

Some Thule period groups seem to have passed part of the autumn at caribou hunting stations, taking advantage of the southward migration of caribou to obtain meat for the early winter. Other groups gathered at fishing sites such as Bloody Falls, where char and caribou were exploited as sources of early winter food. The small hunting group may still have been the basic social unit in these endeavours, although larger communities may have gathered at localities such as Lady Franklin Point.

The absence of recognized Intermediate occupations at all caribou hunting localities examined suggests that the people of this period did not depend heavily on an autumn caribou hunt. The season of autumn and early winter was probably spent in small hunting group communities occupying *qarmat* settlements and engaging in sealing from the thin ice of early winter. Some caribou hunting must have been done in order to supply skins for winter clothing, and some subsistence may have been obtained from seal meat and blubber stored from the spring hunting season.

Large scale autumn caribou hunts were again practised by the historic Copper Eskimo, who depended heavily on this hunt for a supply of skins and for early winter food. Autumn fishing also took place at localities such as Kunana and Bloody Falls, and some seal meat and blubber stored during the previous spring was used at this season. As soon as the new winter ice was safe for travel and occupation, the Copper Eskimo began sealing and the large winter communities formed once more.

The preceding interpretations of the meagre archaeological evidence available suggest that the seasonal patterns of social and economic activities did not undergo an abrupt change at any single point in time. Rather, changes in individual activities took place at different times, and development or change was not always continuous from Thule to Copper Eskimo culture.

Perhaps the most significant change, the decline and eventual cessation of whaling, seems to have been well under way during the Thule period while most other elements of Thule culture in the region remained similar to those of whale-hunting Thule peoples in the eastern and western Arctic. A second significant change, that from small coastal winter settlements to large temporary winter settlements on the sea ice, seems to have occurred near the end of the Thule period. The third apparent change occurred during the Intermediate interval, after which the situation reverted to that of the preceding period. This change, suggested by the prevalence of coastal sealing sites and the apparent absence of Intermediate occupations at caribou hunting stations, seems to involve a larger proportion of the year spent in coastal sealing. In the following chapter an attempt is made to identify the factors which may have produced these changes.

Chapter V The Causes of Culture Change

The evidence which has been presented in the preceding chapters indicates that the amount of change seen in the Thule to Historic sequence in the Copper Eskimo area is consistent with development in virtual isolation from cultural intrusions from other areas or by cultures of non-Thule ancestry. In the present chapter we will attempt to indicate the factors which could have produced changes consistent with those suggested by the archaeological evidence. The most promising factors are of three sorts: geological, climatic, and cultural.

Geological Factors

Perhaps the most widely accepted hypothesis dealing with the decline of Thule culture in the central Arctic is that of Birket-Smith (1929: 233), who related this phenomenon to isostatic events following deglaciation of the area. Crustal upwarping, evidenced throughout the central Arctic by raised strand lines, supposedly created shoaling conditions in certain channels and thus restricted the distribution of the whales which were one of the primary bases of Thule subsistence. The recent publication of several radiocarbon dates associated with strand lines close to present sea level suggests that isostatic adjustment was almost complete prior to the movement of Thule culture into the Copper Eskimo area. Near Holman in western Victoria Island a date of 6945 ± 220 B.C. (GSC-20) was obtained on marine shells which were probably associated with a strand line 30 ft to 35 ft above present sea level. In Richard Collinson Inlet, northern Victoria Island, a sample of marine shells thought to be associated with a strand line 20 ft above present sea level yielded a date of 8270 ± 150 B.C. (GSC-43), and a sample of peat associated with the same strand line gave a date of 250 ± 45 B.C. (GSC-19). At Tree River, on the south coast of Coronation Gulf, a date of A.D. 120 ± 80 (GSC-17) was obtained on plant material from a river estuary deposit only 2 ft above present sea level, suggesting that the shore has risen only 10 ft to 20 ft since that time (Fyles 1963: 36-37). Emergence estimates calculated by Andrews (Andrews et al., 1971: Table 1) suggest a maximum emergence of only 10 ft over the past 800 years in the Copper Eskimo area.

This evidence strongly suggests that if isostatic changes have restricted the movement of whales into the Coronation Gulf area, this restriction took place prior to the appearance of Thule culture and therefore will not serve as a causal factor in explaining the decline of Thule culture. This interpretation is supported by the scarcity of whale bone at Thule period sites in the area east of Cape Parry, which suggests that the distribution of whales during the Thule period was approximately the same as it is at present. The small amount of whale bone reported from archaeological sites in Coronation Gulf (Noice 1922: 612; Jenness 1922: 26) may have been obtained from dead whales which drifted through Dolphin and Union Strait, as occasionally happened in Historic times (Stefansson 1919: 334). We may conclude that isostatic uplift was not a causative force in the decline of Thule culture in this area.

Climatic Factors

An examination of climatic change over the past 1000 years may help to explain cultural change. Several recent studies have outlined the major climatic episodes in the northern hemisphere during this period of time, and the few pieces of evidence from the central Arctic suggest that this area was influenced by the widespread shifts in atmospheric circulation which produced changes in other areas. An excellent summary of climatic change in this period is given by Lamb (1966). For the sake of convenience we shall follow the sequence of named climatic episodes set out by Bryson and Wendland (1967: 280).

Neo-Atlantic: ca. A.D. 900-1200

This period was milder than the preceding Scandic episode, and mean summer temperatures in northern Europe were 1° to 2° C. warmer than at present (Lamb 1966: 7). Drift ice was greatly reduced in the North Atlantic (Koch 1945: Fig. 118), and sea ice probably retreated throughout the Arctic (Baerreis and Bryson 1965: 215). Inland Canada was warmer than during the preceding period, and the Boreal Forest advanced at least 100 kilometres north of the present tree line in the Barren Grounds area west of Hudson Bay (Bryson 1965: 47).

Pacific: ca. A.D. 1200-1550

This episode saw a deteriorating climate in lower latitudes. In northern Europe this was a period of climatic instability, with a mixture of notably severe and notably mild winters (Lamb 1966: 8-10). Voyages between Europe and Greenland were interrupted by drifting ice in the North Atlantic (Lamb 1966: 8), but the amount of pack ice on the north coast of Iceland did not exceed that of the period between 1900 and 1940 A.D. (Koch 1945: Fig. 118). The northern limit of Right whales on the east coast of Ellesmere Island was a few miles north of the present limit during part of this episode (Maxwell 1960: 185). Near Ennadai Lake in the Barren Grounds area, a peat sample dated at approximately A.D. 1320 ± 70 (Wis-133; Nichols 1967: 1667) contained a large proportion of sphagnum spores indicating relatively warm conditions. The Pacific episode may be considered to have been transitional between the warm Neo-Atlantic and the succeeding Neo-Boreal episodes.

Neo-Boreal: ca. A.D. 1550-1850

The climate deteriorated during this episode, reaching a cold peak in the eighteenth century. The summer position of the Arctic front probably moved 4° to 5° south of its present position (Lamb 1966: 102-104), and this may have produced a southward shift in some parts of the tree line. Nichols (1967: 1668) found a high proportion of non-arboreal pollen in humified peat collected near Ennadai Lake and dated between A.D. 1300 and the present. Glaciers on Baffin Island advanced, covering vegetation dated at A.D. 1620 ± 75 (I-1204) and A.D. 1780 ± 105 (I-1603; Andrews 1967: 39-40). Borings in Arctic ice shelves and islands indicate a period of increased accumulation which may coincide with this episode (Crary et al 1955: 1172). Sea temperatures in the North Atlantic were 1° to 3° C. lower than present values (Lamb 1966: 65), and pack ice expanded greatly (Koch 1945: Fig. 118). Pack ice appeared on the northern coast of Iceland for an average of 6.5 weeks per year during the late eighteenth century, compared with

2.5 weeks per year for the first half of the twentieth century (Koch 1945: Figs. 114,116). It seems highly probable that pack ice in the western Arctic also expanded during this episode.

Recent: ca. A.D. 1850-present

A warming trend appeared throughout the northern hemisphere and especially in the Arctic, where open water limits and the ranges of several marine species moved northward (Lamb 1966: 81). Pack ice in the western North Atlantic decreased greatly prior to 1850, and has not since regained its former extent (Lamb 1966: 81). The movement of European and American whalers into North Alaskan waters after 1845 may have been a consequence of reduced pack ice in the western Arctic, as suggested by Vibe (1967: 94). Glaciers retreated in the eastern Canadian Arctic (Falconer 1962), and sea ice may have retreated throughout the Arctic Archipelago. Black (1965: 42) has noted the difference between conditions described in ice navigation reports of the mid-nineteenth century and those encountered at present, but is probably not entirely correct in assigning the change to the lack of aerial reconnaissance in the early explorations.

Although it has been realized for some time that studies of ecological and climatic change are important to an understanding of Eskimo cultural development, the few hypotheses which have been recently advanced regarding the relationship of climatic to cultural change in the central Arctic (Birket-Smith 1959: 27; Maxwell 1960: 185-86; Baerreis and Bryson 1965: 216; Taylor, 1963: 461; 1966: 117) are extremely simplistic and not always well thought out. These hypotheses are useful, and most of them probably contain more than a grain of truth, but none deals with the complete causal chain of events consequent upon a climatic change and resulting in a change in the cultural patterns of the human occupants of the area.

Vibe's (1967) intensive examination of climatic fluctuations in Greenland over the past 150 years indicates the types of relationship which exist between minor climatic changes and the various physical and biological factors which influence human ecology in the Arctic regions. We may postulate, for example, that climatic changes in themselves would be of much less direct significance to the occupants of the central Arctic than were changes in other variables effected by the climatic change. We may further postulate that the two factors of greatest significance were seasonal sea ice conditions and the seasonal location and availability of food animals. On the basis of these hypotheses we may construct a model of environmental change in the central Arctic during the past 1000 years, and deduce from this and from the archaeological evidence a model of cultural change during this millennium.

Thule period: The early part of the Thule period coincided with the Neo-Atlantic climatic optimum, when climate was probably milder than at present. After A.D. 1200 the climate gradually deteriorated, but may not have become appreciably harsher than at present until the seventeenth century. The milder climate probably took the form of a greater frequency of longer and milder summers, perhaps accompanied by somewhat milder winter seasons. The summer limit of pack ice in the Beaufort Sea may have retreated from its present position along the western edge of the Arctic Archipelago and 50 to 100 miles north of the Alaskan coast (Canadian Hydrographic Service, 1961). South of this limit, summer drift ice was probably reduced and open water conditions may have existed for a longer season throughout the Arctic Archipelago. Winter ice may have formed later, been less extensive, thinner and more liable to tide and current cracks than at the present time. The extended season of open water along the coast of North Alaska may have encouraged an increase in the number of whales migrating into the Beaufort Sea area, and the decrease in ice throughout the western Arctic may have permitted more extensive whaling in Amundsen Gulf and perhaps in Melville Sound. Seals were probably as abundant as at the present time but may have spent a longer season in open water and a shorter season in a more restricted area at breathing holes beneath winter ice.

The northern forest limit may have approached more closely to the Arctic coast in the North Alaska and Mackenzie areas, and perhaps in the Coppermine River valley, than at the present time. The northward expansion of the forest combined with the extended season of open water probably increased the supply of driftwood available to occupants of the central Arctic. The milder climate may have resulted in an increased carrying capacity of the Barren Grounds area; in conjunction with the more northerly forest limit, this may have produced an increase in the caribou population available to occupants of the Arctic coast. The milder climatic conditions and increased carrying capacity may have increased the number of caribou wintering on Victoria and Banks Islands, while the lengthened season of open water in Dolphin and Union and Dease Straits may have extended the season which the Dolphin and Union herd spent on Victoria Island. The earlier thawing of lakes and ponds may have increased the number of waterfowl nesting in the area, but the effects of climatic change on the general availability of birds and fish are not known.

The pattern of Thule culture occupation of the central Arctic, as seen archaeologically, may be interpreted readily in terms of the ecological framework outlined above. The initial expansion of Thule culture into the Canadian Arctic was fostered by the expansion of an ecological zone to which the ancestors of the Thule people had adapted technologically by development of the *umiak*-whaling complex. The milder climate of the Neo-Atlantic episode produced an expansion of seasonally ice-free seas in the Canadian Arctic, which in turn expanded the area where seasonal whaling and travel by large skin boat were feasible. The environmental conditions of the period, as well as the archaeological evidence (permanent winter villages and the scarcity of dog sledding equipment on Thule sites in the western central Arctic) suggest that most travelling was done in the summer. The use of large skin boats may have been the primary factor in giving the Thule people an ecological advantage over the Dorset inhabitants of the central Arctic.

Having reached the Coronation Gulf area, Thule culture had to be adapted to a new set of local conditions. The *umiak* still constituted an admirable means of summer transportation, but could not be used for whaling in this area. As Taylor (1966: 116) has pointed out, however, even the most avid Arctic whale hunters must have subsisted largely on food derived from less impressive sources. The massive herds of caribou in the central Arctic must have constituted a food reservoir which provided an admirable substitute for whales. The large number of caribou bones at Thule winter sites such as Lady Franklin Point and Bell is consistent with the suggestion that both migratory and sedentary caribou populations were extremely abundant in the area during the Thule period. The location of other winter sites, such as Memorana, is consistent with a pattern of sealing in open water or at tide and current cracks, which agrees with the postulated thinner and less stable winter ice conditions at this time. The permanent coastal locations of winter villages and the scarcity of dog sledding equipment again conforms to the postulate of unstable winter ice conditions. Ice conditions may have limited the size of Thule winter communities to a much smaller unit than those observed among historic Central Eskimo.

Intermediate interval: The Intermediate interval seems to have mainly coincided with the Neo-Boreal climatic episode, characterized by a deteriorating climate which probably took the form of more frequent long and harsh winters and perhaps cooler summers. Pack ice is known to have advanced in the western North Atlantic, and it may be assumed that this was paralleled by an advance in the summer limit of permanent pack ice throughout the entire North American Arctic. Winter ice may have formed earlier, become thicker and more stable, and lasted longer into spring and summer than it did during the Thule period.

If the summer limit of pack ice in the Beaufort Sea advanced to about 1° south of its present position, it would have impinged on the coast of North Alaska between Point Barrow and Herschel Island in most years. This would have impeded or prevented the northward migration of bowhead whales from the Bering Sea into the Beaufort Sea and Amundsen Gulf area, thus destroying the whaling industry in the western Canadian Arctic. The distribution of white whales may have been limited by the same conditions. Seals may have remained as abundant as they were during the Thule period, but ringed and bearded seals must have passed a longer season in an expanded area at breathing holes beneath winter ice. The locations of thin and smooth single-season winter ice areas may have changed from the preceding period. With a decrease in summer melting, ice may have remained throughout the year in many of the bays and smaller channels of the central Arctic; the thickness of this ice after a second winter would then have prevented seals from maintaining winter breathing holes in these areas. Conversely, extensive stretches of single season ice may have existed in open areas such as Amundsen Gulf, which were not subject to winter freezing during the preceding and succeeding periods.

The postulated decreased carrying capacity of the Barren Grounds area, as well as the southward retreat of the forest limit to a position close to that at present, may have reduced the size of caribou herds migrating northward to the Arctic coast and Victoria Island. Reduced carrying capacity and harsher winters may have reduced the size of Victoria and Banks Island caribou herds, and the postulated earlier freeze-up and later break-up of ice in the Coronation Gulf area may have allowed migratory caribou to spend a shorter calving season on Victoria Island. The extended period of ice cover on lakes and ponds may have diminished the supply of migratory waterfowl available to inhabitants of the Arctic coastal areas; conversely, this may have lengthened the season of lake fishing through spring ice.

The sparse archaeological evidence assigned to the Intermediate interval may reflect an adjustment to the harsher environmental conditions outlined above. The absence of recognized Intermediate occupations at caribou hunting localities used during the Thule and Historic periods conforms to the postulated scarcity of caribou in the area during the Neo-Boreal episode. This in turn must have increased the importance of spring and autumn sealing, which is reflected in the autumnal seal hunting *qarmat* sites and in the large tent ring sites which suggest an extended period of spring sealing at the ice edge, at tide or current cracks, or in *utoq* hunting on top of the spring ice. It might be noted that all of these recognized Intermediate occupations are located along the coast of Amundsen Gulf and Dolphin and Union Strait, within a day's sled journey of an area of open sea which is at present ice-free most or all of the winter season. This may suggest that the Intermediate occupation was concentrated near an area of open sea which melted each summer and thus provided a large area of new ice each winter.

The increase of late or permanent ice and drift ice in the channels of the Arctic Archipelago may have depreciated the value of the *kayak* and *umiak* as hunting devices and as modes of transportation during this climatic episode. Conversely, the increased area and extended season of stable sea ice conditions may have encouraged the use of the dog sled. The absence of coastal winter settlements strongly suggests that the long winter season was spent on the sea ice, and that breathing hole sealing was a vitally important economic activity. Winter was passed in snow house settlements, and the large semi-nomadic winter communities characteristic of the Historic period were probably formed as a consequence of the change from permanent to shifting winter settlements. Damas (1969*b*: 51) suggests that a large community is necessary if subsistence is based on sealing at breathing holes through unbroken winter ice: each seal has a number of breathing holes which it visits irregularly, therefore no single hunter can be certain of catching seals at the regular intervals necessary to sustain his family, therefore a large number of hunters linked by a reciprocal or cooperative sharing arrangement is necessary in order to consistently surmount the level of probability involved. Stefansson (1913: 170) has pointed out that the number of seals within the effective radius of a winter hunting camp (approximately five miles) is limited by the difficulty of movement beneath the ice. From their small permanent winter villages, small groups of Thule hunters could exploit a limited area throughout the entire winter season, especially in areas where the presence of cracks and leads provided a mobile seal population. With the more stable sea ice conditions of the Neo-Boreal episode, and with the consequent sedentary seal populations which had to be obtained at breathing holes, the adoption of the temporary snow house as a winter dwelling on the sea ice allowed the population to move several times during the winter and thus permitted the formation of larger winter communities. Stefansson (1913: 170) noted that communities during the Historic period were forced to move over a distance of about 10 miles approximately once a month throughout the winter. The remarkable paucity of artifacts and refuse at Intermediate interval sites may reflect the nomadic pattern of living adopted at this time, as suggested by Harp (1961: 66) in the case of the historic Caribou Eskimo.

Historic period: The Historic period coincides with the end of the Neo-Boreal climatic episode and the early part of the Recent episode, a period characterized by a general climatic amelioration. The summer limit of pack ice retreated to its present location, thus allowing whales (and whalers) to enter the Beaufort Sea and Amundsen Gulf. Sea ice probably diminished in seasonal extent throughout the Arctic Archipelago. The carrying capacity of the tundra may have increased in response to the warming climate, increasing the number of caribou migrating to the Arctic coast and resident on the Arctic islands. Manning (1960: 45) estimates that 100,000 caribou migrated annually from the mainland to Victoria Island during this period. The far northward migration of caribou may have been encouraged by the depredations of Indian hunters with firearms in more southerly areas. Slight changes in the seasonal availability of seals, birds and fish may also have occurred.

The people of the Historic period seem to have spent the winter season in much the same way as did their ancestors of the Intermediate interval. Spring however, saw a direct shift from breathing hole sealing to inland caribou hunting, a change from the postulated Intermediate pattern which involved an extended period of coastal sealing. This change is in accord with the suggestion that caribou became more abundant at the beginning of the Recent climatic episode. Although open water conditions seem to have become more prevalent during the Recent episode, *umiak* and *kayak* hunting techniques which had fallen into disuse during the Intermediate interval were not reinstated. Summer and autumn were spent primarily in caribou hunting, as in the Thule period, which is in accordance with the hypothesis that caribou were more abundant in the area during these periods.

As can be seen from the above discussion, most of the major cultural changes which have occurred over the past 1000 years in the Copper Eskimo area are consistent with continuous adaptation to changing environmental conditions. There thus appears to be an indirect causal relationship between climatic change and changes in major cultural patterns. During the nineteenth century, however, change was probably influenced by a second major factor, the intrusion of indirect and eventually direct European influence into the area.

European Influence

The effects of pre-contact European influence in the central Arctic have been largely ignored, except by Service (1962: 103) who has suggested that recent depopulation due to disease introduced by Europeans caused a breakdown in the aboriginal social organization prior to ethnographic description of the Copper Eskimo. Service's meagre evidence, based almost entirely on Stefansson's (1919) work, is almost all faulty or misinterpreted. Nevertheless, there is a good deal of indirect evidence which hints at changes in population distribution and trading patterns during the century prior to ethnographic description, and this evidence should be examined.

The distributional evidence presented in Chapter II suggested that the aboriginal Copper Eskimo's closest contacts were with the Netsilik to the east, and with Eskimo who lived along the Arctic coast to the west of Cape Parry. At the time of European contact, the Copper-Netsilik axis was still functioning in terms of trade for iron objects and occasional intermarriage (Jenness 1922: 49-50). Although there was no contact between the Copper Eskimo and those of the Mackenzie and North Alaskan areas at that time, Jenness (1922: 44-45) found several indications that this western axis of contact had still been in operation during the first half of the nineteenth century. This axis seems to have operated in terms of intermittent trade (Copper Eskimo soapstone and copper for Western Eskimo iron objects), rare intermarriage, and occasional movement of individuals or entire families from one group to the other. Jenness (1922: 44) estimated that this contact ceased about two generations prior to 1914.

The termination of contact with groups to the west may have been the result of the depopulation of the western district by epidemic disease, such as the outbreak of measles which decimated the Cape Bathurst Eskimo trading at Ford Anderson in 1865 and 1867 (Stager 1967: 56). The people at Langton Bay, just to the west of Cape Parry, were also decimated by disease about this time, and the survivors abandoned the area (Stefansson 1919: 308, 332). The Eskimo from Cape Bathurst abandoned that area in 1869 and moved west to winter with the Mackenzie Eskimo (Stager 1967: 56), so that by 1870 the Copper Eskimo were separated from their western neighbours by a coastal distance of over 300 miles.

Copper Eskimo trade for European materials brought them into contact with Eskimo groups to the east and southeast. Sir John Franklin's interpreter for the journey of 1819-22, a Caribou Eskimo from the vicinity of Churchill, stated that one of the northern tribes which occasionally traded with his people was named "Kang-orr-moeoot," and that the members described themselves as having crossed land from a northern sea at a great distance (Franklin 1823: 263-64). This group is probably the *Kanghiryuarmiut* of western Victoria Island; Stefansson (1919: 36-37) stated that each year a few families of this group set off on an overland journey to the Thelon River, where they traded with Hudson Bay Eskimo for wood and European material. Jenness (1922: 48) described a route through Bathurst Inlet, used by Coronation Gulf Eskimo to reach the Thelon River for the same purpose. This trade was probably initiated soon after the establishment of European trading posts in Hudson Bay (Birket-Smith 1929: 162), and increased in importance through time. Franklin's interpreter stated that trade with the northern groups took place only occasionally during the early nineteenth century, while annual trading expeditions were being made by Stefansson's time.

The postulated changes in contact patterns after the introduction of European materials and diseases are important factors in the interpretation of distributional and archaeological evidence. Some of the similarities noted between the Copper Eskimo and their neighbours to the east and southeast may be the result of recent diffusion along the trade routes established in order to obtain European material. On the other hand, the similarity of Copper and North Alaskan Eskimo on most distributional criteria, as well as the appearance of several western elements in the material culture of the Copper Eskimo, is not compatible with total absence of contact between these tribes, which was the situation at the time of European exploration. This evidence is, however, consistent with the ethnohistoric indications that trade and intermarriage between these tribes existed prior to the mid-nineteenth century. The evidence for continuous contact between central and western Arctic tribes in aboriginal times also depreciates the value of the "Thule backwash" hypothesis as an explanation for the appearance of central Arctic material culture elements in North Alaskan archaeological sequences during the few centuries immediately prior to European contact. Trade relations, rather than the migration of people, would seem to be an adequate explanation for this phenomenon.

Pre-contact European influence probably had more direct consequences than the changing of aboriginal contact patterns. Although most of the major items of European material culture (e.g. rifles, boats, clothing) were not traded into the area until after 1905, small articles such as knives, files, and metal fragments trickled into the area in ever increasing quantities during the late eighteenth and nineteenth centuries. It seems unlikely that this material could have wrought a fundamental change in basic cultural patterns; changes in material culture did occur however, and many of the metal-adapted artifacts noted in the preceding chapter were probably invented at this time. The introduction of European metal articles may have stimulated an increase in the use of native copper, both as an element of the new metal-adapted material culture and as a trading commodity. Although native copper was used by the Thule and Intermediate inhabitants of the area, it seems to have been used more extensively during the Historic period. Several artifacts of bone, antler and stone (blades for arrows, harpoon heads, knives and adzes, leister barbs, needles) which were found at the nineteenth century Kunana site had been replaced by copper tools in the early twentieth century. The potentials and exchange value of native copper may have been fully realized only after the introduction of European metal goods. Much of the distinctiveness of Copper Eskimo material culture may therefore be an indirect result of pre-contact European influence.

European diseases may have accompanied trade goods into the Copper Eskimo area in the early Historic period. Although Jenness (1922: 42) claimed that the Copper Eskimo of 1914 were remarkably healthy and showed no evidence of measles, influenza, tuberculosis or venereal diseases, native traditions and population distributions led him to the conclusion that a substantial decrease in population had recently occurred. The densely settled Bathurst Inlet area was said to have been depopulated by disease some three generations prior to 1914, and this tradition was corroborated by the fact that most of the inhabitants were first, second or third generation immigrants from other regions (Jenness 1922: 39-40). Possibly this event was related to the smallpox epidemics of the late eighteenth century which killed a reported 90 per cent of the Chipewyan Indians trading at Hudson Bay (Hearne 1958: 115). The Chipewyan at that time were associating, under the auspices of the Hudson's Bay Company, "in perfect peace and friendship" with Eskimos on the west coast of Hudson Bay (Hearne 1958: 217), the same Eskimos with whom the Copper Eskimo traded on the Thelon River.

Depopulation of the west end of Coronation Gulf, suggested by the extinction of some named local groups and a general confusion of group names (Jenness 1922: 36), may have been the result of disease contracted from the west; some of the survivors of the mid-nineteenth century Langton Bay epidemic apparently moved to the east (Stefansson 1919: 308) and may have joined the Copper Eskimo. A *Kanghiryuarmiut* informant told Stefansson (1919: 29) that the former inhabitants of western Victoria Island north of Minto Inlet were exterminated by white men from the Franklin Search Expedition ships, in revenge for some murders which the Eskimos had committed. This tradition, if it has any basis at all, may refer to an epidemic disease contracted from Collinson's ship when it wintered to the north of Minto Inlet in 1851-52, or perhaps from the abandoned *Investigator* in northern Banks Island.

Influenza epidemics are known to have occurred among the Iglulik Eskimo during the winter of 1846-47 (Rae 1850: 174), and among the Hare and Chipewyan Indians hunting in close proximity to Copper Eskimo hunters east of Great Bear Lake in the summer of 1837 (Simpson 1843: 200-204). Outbreaks of influenza probably occurred frequently among neighbouring populations throughout the nineteenth century, and if any of these epidemics spread to groups of Copper Eskimo the results would have been disastrous. Even with medical attention and hospitalization there was 20 per cent mortality during the 1949 influenza epidemic among the Copper Eskimo of Cambridge Bay, by far the highest mortality reported for influenza among isolated populations (Brown, Gajdusek and Morris 1966: 180). Although pulmonary diseases were absent among the Copper Eskimo seen by Jenness, Hansen was told by a party of southeastern Copper Eskimo that seven of their number had died during the previous winter (1904-1905) of a lung disease (Amundsen 1908: Vol II, 329).

These indications suggest that Jenness may have been correct in postulating depopulation of some Copper Eskimo groups by introduced disease prior to direct contact with Europeans. Two processes of population redistribution may have resulted: first, the movement of survivors to join unscathed communities, governed by the necessity for maintaining ecologically viable hunting group units, and second, the movement of hunting groups back into the abandoned area after the fear of disease had died out. Historic trade patterns, which saw members of several local groups combine for trading expeditions to obtain European goods, may also have contributed to the mixing of local groups. These processes may be reflected archaeologically in the extreme variability of harpoon head and arrowhead classes found at the Kunana site. Stefansson (1919: 90) reported that the variability of arrowheads used by a single local group was the result of "the frequent marrying of men into distant groups, where a son may continue his father's methods in spite of the different practice of those around him."

The introduction of European diseases and new trading patterns may have increased the heterogeneity of Copper Eskimo communities and local groups, but could hardly have totally destroyed the aboriginal social structure, as is suggested by Service (1962: 103). Most epidemics could only have affected small hunting groups or local bands; other disasters of this scale, including starvation, Indian raids, and the drowning or marooning of small groups during periods of unstable ice conditions, are frequently mentioned in historical accounts of the Copper Eskimo. Similar occurrences were probably common during the Intermediate interval, when climatic change resulted in unpredictable changes in the seasonal distributions of food animals and of ice conditions. The introduction of disease would therefore merely have increased the frequency of small-scale disasters, and not constituted a sudden threat to the entire population with a resulting change in the basic patterns of social organization.

Damas (1969*b*) has argued that the unique character of the historic Copper Eskimo social organization is explicable in terms of both ecological and historical influences acting on the basic Thule type of organization. The necessary ecological and historical conditions are consistent with those suggested by the archaeological and distributional evidence presented previously. One cluster of unique Copper Eskimo social traits includes agamous marriage practices and associated elements of kinship terminology. Damas (1969*b*: 54) suggests that this cluster may be related to the practice of selective female infanticide: if the universe of marriageable women is reduced through female infanticide, it must be reciprocally enlarged through rule changes. If the practice of female infanticide developed in response to a deteriorating subsistence level, such as that which occurred during the Intermediate interval, then we may suggest that agamous marriage practices, associated kinship terminologies, and perhaps the importance of adoption and child betrothal, may be indirect results of the climatic change which brought about the decline of Thule culture in the Copper Eskimo area.

The second cluster of uniquely Copper Eskimo social traits includes the unimportance of kin directives beyond the nuclear family, and the reciprocal importance of voluntary partnerships and associations in the formation of hunting groups, household organization, and food sharing outside the nuclear family. Damas (1969*b*: 59) suspects that these elements of the Copper Eskimo social pattern may have been influenced by historical rather than by purely ecological factors; this argument is supported by the fact that the neighbouring Netsilik Eskimo, inhabiting an environment very similar to that of the Copper Eskimo, place much greater emphasis on kinship organization and much less on voluntary partnerships. This difference may be related to the historical affiliations between the Copper Eskimo and their neighbours to the west. Although the aboriginal inhabitants of the western Canadian Arctic coast and the Mackenzie Delta area have not been adequately described by ethnographers, they seem to have closely resembled the inhabitants of the North Alaskan coast. These North Alaskan Eskimo, to a greater extent than any Canadian Eskimo groups, based much of their social organization on various types of partnership and on voluntary organizations such as hunting crews and men's house groups (Spencer 1959: 450). The voluntary aspects of Copper Eskimo social organization may, therefore, merely reflect the relationship to western Arctic Eskimo groups which has been suggested on the basis of the distributional and archaeological evidence.

If the above interpretations are correct, we may assume that precontact European influence affected Copper Eskimo social organization only by increasing the heterogeneous composition of communities and local groups, a change in degree rather than in kind from the aboriginal situation. The social organization of the Copper Eskimo may be interpreted as the product of the same set of influences that are apparent from examination of the material culture: a Thule base, altered through adaptation to a deteriorating environment, modified by continuing impulses from neighbouring groups, and finally showing a few changes which may be the result of impinging European influence during the nineteenth century.

Conclusions

The results of this study may be presented most appropriately as a series of speculative hypotheses which may be tested by further research:

(1) The biological and cultural ancestors of the historic Copper Eskimo were the people who migrated to the Victoria Island - Coronation Gulf area approximately 1000 years ago and are recognized archaeologically as the bearers of Thule culture.

(2) The initial eastward movement of Thule culture was fostered by the expansion of an ecological zone to which the ancestors of the Thule people had become adapted. On reaching the Victoria Island - Coronation Gulf area, a distinctive variant of Thule culture was developed as an adaptation to the local environmental conditions.

(3) Many of the most distinctive elements of Thule culture went out of use during the Neo-Boreal climatic episode. The adaptation of the local Thule variant to changed environmental conditions caused by a cooling climate produced most of the major changes from Thule to Copper Eskimo culture.

(4) Throughout its development, Copper Eskimo culture was influenced by either sporadic or continuous diffusion from neighbouring Eskimo groups, especially those occupying the Arctic coast to the west.

(5) The final development of Copper Eskimo culture as it is known ethnographically took place during the nineteenth century, and was influenced by the intrusion of indirect European influence into the area.

Appendix

This appendix consists of a list of the words used as the basis for the lexicostatistical calculations in Chapter II. The symbols at column heads represent the following dialects:

G: West Greenland (Birket-Smith 1928: 33-46).
I : Iglulik (Birket-Smith 1928: 33-46).
N: Netsilik (Birket-Smith 1928: 33-46).
P: Padlimiut (Caribou) (Birket-Smith 1928: 33-46).
C: Copper (Rasmussen 1932: 332-45).
A: North Alaska (Rasmussen 1941: 13-28).

For each word in the list, cells which are unmarked are cognate with all other unmarked cells; cells marked with a numeral are cognate only with cells marked with the same numeral.

Word	G	I	N	P	C	A
spring						
summer						
autumn						
winter						
day						
morning						
evening						
night						
yesterday						
tomorrow		1				
day after tomorrow		1		1		
last year	1		2			
long ago	1			1		
sky						
moon	1					
star						
wind						
cloud						
aurora borealis						1
falling snow				1		
snow on ground						
fog	1					
fresh water						
spring of water						
river						
lake						
swamp				1	2	2
sea	1					
bay	1					
strait			1			
land						

Word	G	I	N	P	C	A
island						
cape		1				2
valley					1	1
mountain	1	1	2	2	1,2	2
plain				1	1	1
portage						
winter ice						
young ice						
drift ice						
pack ice						1
new ice without snow						
sun						
rain						
haze			1			
bowhead whale						
white whale						1
polar bear						
black bear						
fox						
ermine						
muskox						
caribou						
bull caribou						
cow caribou	1				1	1
caribou calf						
wolf						
hare						
lemming						
walrus						
ringed seal						
old ringed seal				1		
bearded seal						
spotted seal						
wolverine						
marmot						
dog						
Lapland bunting		1	1	2	3	3
snow bunting			1	2	2	2
raven				1		
ptarmigan						
sea eagle					1	2
owl						
red throated loon						
burgomaster gull						
herring gull						
swan						

Word	G	I	N	P	C	A
long-tailed duck						
eider duck						
king eider	1	1,2	1	2	1	1
sea scorpion						
trout						
tern						
spider						
fly	1	2	1,2	1	1	1
mosquito	1					
bee						
butterfly	1					
mussel						
louse						
Cassiope		1				2
reindeer moss		1	2	2	2	3
grass						
lamp moss					1	1
crowberry						
willow					1	1
birch				1		
person						
man						
woman						
child						
ancestors				1	2	
grandfather						
grandmother						
father						
mother						
sibling		1				
husband						
wife						
son						
daughter						
elbow						
ankle	1	2				
face						
arm						
buttocks						
leg						
blood						
breasts					1	1
anus						
thumb						
index finger						
middle finger						

Word	G	I	N	P	C	A
ring finger						
little finger						
foot						
hand						
forehead						
cheek						
chin						
hair						
neck						
heart						
head						
heel						
bone						
knee						
thigh						
mouth						
nape of neck						
navel						
nail						
nose						
upper arm						
beard						
tooth						
testicle						
eye						
ear						
penis						
vagina						
snow house						1
tent			1			2
porch						
window						
side platform		1			1	1
rear wall						
lamp						1
cooking pot			1			
spoon						
water bucket						
ice scoop						1
urine pot						
fire lighter		1				
snow knife			1	1		
snow shovel	1					
village	1	2	1	1	1,2	2
soup ladle						
boot						

Word	G	I	N	P	C	A
stocking						
caribou jacket						1
men's trousers		1				
women's trousers		1	1	1	2	3
hood						
mittens	1					1
snow goggles						
comb						
breathing hole			1			
harpoon						
harpoon head			1	1	2	
harpoon line			1	2		
wound plug	1					2
bow						
arrow						
feathering						
arrowhead						
quiver					1	
bird snare						
sling						
fish-hook						
leister						
fish weir						
fish decoy	1			1		
kayak						
kayak manhole						
kayak keel						
kayak side keel						
kayak rib						
kayak crossbar						
kayak paddle						
sled						
sled crossbar						
dog harness						
carving knife						1
drill bow		1		2	2	2
drill mouthpiece						
needle						
women's knife						
thimble						
sinew thread						
shaman						
helping spirit						
amulet				1		
song	1	1	1	1	1,2	2
one						

Word	G	I	N	P	C	A
two						
three						
four						
five						
six						1
seven						1
ten	1	2	1,2	2	3	1
obeys	1			1		
refrains		1	2	3		
arrives						
ignites						
asks			1		1	
pays						
covers a boat						
blows			1			
drills		1		2	2	
builds a kayak						
drinks						
kills						
dies						
catches seal						1
fishes			1			2
skins an animal						1
skins a bird						
skins a seal						
tells a myth	1					
walks						
forgets						
softens skins			1	2	3,4	4
weeps						1
harpoons						
cures	1	2	1	1	3	1,3
helps						
remembers						
rests			1	1	2	1
hears						
repairs		1		1		
buys	1	1				2
boils						
lands a boat					1	
plays	1	1	2	1,3	2	3
laughs						
shines						
tells lies						
runs (man)	1				1	1

Word	G	I	N	P	C	A
runs (animal)						
smells						
travels				1		
hunts caribou			1	2		1
paddles						
sees						
speaks			1		1	
scrapes a skin			1	2	3	
tastes						
snows	1			1		
sleeps						
eats						
answers						
chews						
stretches a skin						
softens		1				
feels				1		
sews						1
rains	1					1
is good			1	2	1	2
is bad			1	2	2	3
is big						
is small						
I						
you (sing.)						
he, she, it						
we						
you (plural)						
they						
these						
who						
what						
yes						
no					1	
thank you				1		
when (future)						
when (past)						
perhaps		1	2	2	3	4
why						1
how						

Total: 300

Bibliography

Amundsen, R.

(1908). *The North West Passage.* Vol. II. London, Constable.

Andrews, J.T.

(1967). Radiocarbon dates obtained through geographical branch field observations. *Geog. Bull.* 9(2): 115-62.

Andrews, J.T., Robert McGhee and Lorna McKenzie-Pollock

(1971). Comparison of elevations of archaeological sites and calculated sea levels in Arctic Canada. *Arctic* 24(3): 210-28.

Baerreis, D.A. and R.A. Bryson

(1965). Climatic episodes and the dating of the Mississippian cultures. *Wisconsin Archaeol.*, n.s. 46(4): 203-21.

Bandi, H.G. and J. Meldgaard

(1952). Archaeological investigations on Clavering Ø, Northeast Greenland. *Meddelelser om Grønland* 126(4). Copenhagen.

Birket-Smith, K.

(1928). Five hundred Eskimo words. *Report of fifth Thule expedition, 1921-24,* 3(3). Copenhagen.

(1929). The Caribou Eskimos. II. analytical part. *Ibid.*, 5(2). Copenhagen.

(1930). The question of the origin of Eskimo culture: a rejoinder. *Amer. Anthrop.* 32(4): 608-24.

(1940). Anthropological observations on the Central Eskimos. *Report of fifth Thule expedition, 1921-24,* 3(2). Copenhagen.

(1945). Ethnographical collections from the Northwest passage. *Ibid.*, 6(2). Copenhagen.

(1959). *The Eskimos.* London, Methuen.

Black, W.A.

(1965). Sea-ice survey, Queen Elizabeth Islands region, summer 1962. *Geog. Pap.*, no. 39, Geog. Br., Dept. Mines Tech. Surv. Ottawa.

Boas, F.

(1888). The Central Eskimos. *6th Ann. Rept., Bur. Amer. Ethnol. 1884-85.* Washington.

(1910). Ethnological problems in Canada. *J. Royal Anthrop. Inst.* 40: 529-39. London.

Brown, P., C. Gajdusek and J.A. Morris

(1966). Epidemic A2 influenza in isolated Pacific island populations. *Amer. J. Epidemiology* 83: 176-88.

Bryson, R.A.

(1965). Radiocarbon and soil evidence of former forest in the southern Canadian tundra. *Science* 147: 46-48.

Bryson, R.A. and W.M. Wendland

(1967). Tentative climatic patterns for some Late Glacial episodes in central North America. *Life, land and water,* ed. W.J. Mayer-Oakes, pp. 271-98. Winnipeg, Univ. Man. Press.

Canadian Hydrographic Service

(1961). Arctic Islands, Davis Strait to Beaufort Sea including connecting passages. Chart 7000. Ottawa.

Chown, B. and M. Lewis

(1956). The blood group genes of the Cree Indians and the Eskimos of the Ungava district of Canada. *Amer. J. Phys. Anthrop.*, n.s. 14(2): 215-24.

(1959). The blood group genes of the Copper Eskimos. *Ibid.*, n.s. 17(1): 13-18.

(1962). The blood group and secretor genes of the Eskimo on Southampton Island. *Natl. Mus. Canada, Contrib. Anthrop., 1960, Bull.* 180: 181-90. Ottawa.

Collins, H.B.

(1937). The archaeology of St. Lawrence Island, Alaska. *Smithsonian Misc. Collections* 96(1). Washington.

(1952). Archaeological excavations at Resolute, Cornwallis Island, N.W.T. *Natl. Mus. Canada, Ann. Report 1950-51, Bull.* 126: 48-63. Ottawa.

(1956). The TI Site at Native Point, Southampton Island, N.W.T. *Univ. Alaska, Anthrop. Pap.* 4(2): 68-69.

(1964). The Arctic and Subarctic. In *Prehistoric man in the new world,* ed. J.D. Jennings and E. Norbeck, pp. 85-114. Chicago, Univ. Chicago Press.

Collinson, Sir R.

(1889). *Journal of H.M.S. Enterprise, on the expedition in search of Sir John Franklin's ships by Behring Strait, 1850-55.* London, Low, Marston, Searle and Rivington.

Cook, S.F. and A.E. Treganza

(1950). The quantitative investigation of Indian mounds. *Univ. Calif. Publ., Amer. Archaeol. Ethnol.* 40: 223-61. Berkeley.

Corcoran, P.A., E.H. Allen, A.C. Allison and B.S. Blumberg

(1959). Blood groups of Alaskan Eskimos and Indians. *Amer. J. Phys. Anthrop.*, n.s. 17(2): 187-93.

Crantz, D.

(1820). *The history of Greenland.* Vol. I. London, Longman, Hurst, Rees, Orme and Brown.

Crary, A.P., J.L. Kulp and E.W. Marshall

(1955). Evidences of climatic change from Ice Island studies. *Science* 122: 1171-73.

Damas, D.

(1969*a*). Characteristics of Central Eskimo band structures. *Natl. Mus. Canada Contrib. Anthrop., Bull.* 228: 116-38. Ottawa.

(1969*b*). Environment history and central Eskimo society. *Ibid.*, 230: 40-64.

Dumond, D.E.

(1965). On Eskaleutian linguistics, archaeology and prehistory. *Amer. Anthrop.* 67(5): 1231-57.

Dunning, R.W.

(1966). An aspect of domestic group structure among eastern Canadian Eskimo. *Man*, n.s. 1 (2): 216-25.

Ellegard, E.

(1959). Statistical measurement of linguistic relationship. *Language* 35(2): 131-156.

Falconer, G.

(1962). Glaciers of north Baffin and Bylot Islands, N.W.T. *Geog. Pap.*, no. 33. Geog. Br., Dept. Mines Tech. Surv. Ottawa.

Ford, J.A.

(1959). Eskimo prehistory in the vicinity of Point Barrow, Alaska. *Anthrop. Pap., Amer. Mus. Nat. Hist.* 47(1).

Franklin, J.

(1823). *Narrative of a journey to the shores of the Polar Sea, in the years 1819, 20, 21, and 22.* London, John Murray.

(1828). *Narrative of a second expedition to the shores of the Polar Sea, in the years 1825, 1826 and 1827.* London, John Murray.

Fyles, J.G.

(1963). Surficial geology of Victoria and Stefansson Islands, District of Franklin. *Geol. Surv. Canada Bull.* 101. Ottawa.

Gessain, R.

(1960). Contribution à l'anthropologie des Eskimo d'Angmagssalik. *Meddelelser om Grønland* 161(4). Copenhagen.

Giddings, J.L.

(1952). The Arctic woodland culture of the Kobuk River. *Mus. Monographs. Univ. Mus.* Philadelphia.

(1964). *The archaeology of Cape Denbigh.* Providence, R.I., Brown Univ. Press.

Grant, J.

(1930). Anthropometry of the Chipewyan and Cree Indians of the neighbourhood of Lake Athabaska. *Natl. Mus. Canada, Anthrop. Ser. no. 14, Bull.* 64. Ottawa.

Hammerich, L.L.

(1958). The origin of the Eskimo. *Proc. 32nd Intl. Congr. Americanists, 1956.* Copenhagen.

Harp, E.

(1961). The archaeology of the Lower and Middle Thelon, Northwest Territories. *Arctic Inst. North Amer., Techn. Pap.* no. 8. Montreal.

(1964). The cultural affinities of the Newfoundland Dorset Eskimo. *Natl. Mus. Canada. Anthrop. Ser. no. 67, Bull.* 200. Ottawa.

Harp, E. and D. Hughes

(1968). Five prehistoric burials from Port Aux Choix, Newfoundland. *Polar Notes*, no. 8. Hanover, N.H.

Hatt, G.

(1916). Kyst-og Indlandskultur i det Arktiske. *Geografisk Tidsskrift* 23(8): 284-90. Copenhagen.

Hearne, S.

(1958). *A journey from Prince of Wales' fort in Hudson's Bay to the Northern Ocean, 1769-1770-1771-1772*, ed. R. Glover. Toronto, Macmillan.

Herdan, G.

(1964). *Quantitative linguistics.* Washington, Butterworth's.

Hirsch, D.I.

(1954). Glottochronology and Eskimo-Aleut Prehistory. *Amer. Anthrop.* 56: 825-838.

Holtved, E.

(1944). Archaeological investigations in the Thule District. Vol. I. *Meddelelser om Grønland* 141 (1). Copenhagen.

(1954). Archaeological investigations in the Thule District. Vol. III. *Ibid.*, 146 (3).

Jenness, D.

(1922). The life of the Copper Eskimos. *Report of the Canadian Arctic Expedition, 1913-18*, vol. 12, part A. Ottawa.

(1923*a*). Origin of the Copper Eskimos and their Copper Culture. *Geog. Rev.* 13(4): 540-51.

(1923*b*). Physical characteristics of the Copper Eskimos. *Report of the Canadian Artic Expedition, 1913-18*, vol. 12, part B. Ottawa.

(1928). Comparative vocabulary of the Western Eskimo dialects. *Report of the Canadian*

Arctic Expedition, 1913-18, vol. 15, part A. Ottawa.

(1937). The Indian background of Canadian History. *Natl. Mus. Canada, Anthrop. Ser. no. 21, Bull.* 86. Ottawa.

(1946). Material culture of the Copper Eskimos. *Report of the Canadian Arctic Expedition, 1913-18,* vol. 16. Ottawa.

Klengenberg, C.

(1932). *Klengenberg of the Arctic: an autobiography.* London, Cape.

Koch, L.

(1945). The East Greenland Ice. *Meddelelser om Grønland* 130(3). Copenhagen.

Lamb, H.H.

(1966). *The changing climate.* London, Methuen.

Larsen, H. and F. Rainey

(1948). Ipiutak and the Arctic whale hunting culture. *Anthrop. Pap., Amer. Mus. Nat. Hist.* 42.

Laughlin, W. S. and J. B. Jørgensen

(1956). Isolate variation in Greenlandic Eskimo crania. *Acta Genetica et Statistica Medica* 6: 3-12. Basel.

Laughlin, W.S. and W.E. Taylor

(1960). A Cape Dorset culture site on the West Coast of Ungava Bay. *Natl. Mus. Canada, Contrib. Anthrop., 1958, Bull.* 187. Ottawa.

MacNeish, R.S.

(1956). Archaeological reconnaissance of the Delta of the Mackenzie River and Yukon Coast. *Natl. Mus. Canada, Ann. Report 1954-55, Bull.* 142: 46-81. Ottawa.

(1959). A speculative framework of northern prehistory. *Anthropologica,* n.s. 1(1-2): 7-23. Ottawa.

Manning, T.H.

(1956). Narrative of a second defence research board expedition to Banks Island. *Arctic* 9 (1-2): 3-77. Montreal.

(1960). The relationship of the Peary and Barren Ground Caribou. *Arctic Inst. North Amer., Tech. Pap.* no. 4. Montreal.

Mathiassen, T.

(1927*a*). Archaeology of the Central Eskimos I: descriptive part. *Report of fifth Thule expedition, 1921-24.* 4 (1). Copenhagen.

(1927*b*). Archaeology of the Central Eskimos II: analytical part. *Ibid.*, 4 (2).

(1928). Material culture of the Iglulik Eskimos. *Ibid.*, 6.

(1930). The question of the origin of Eskimo Culture. *Amer. Anthrop.* 32(4): 591-607.

(1933). Prehistory of the Angmagssalik Eskimos. *Meddelelser om Grønland* 92(4). Copenhagen.

Maxwell, M.S.

(1960). The movement of cultures in the Canadian High Artic. *Anthropoligica,* n.s. 2 (2): 177-89. Ottawa.

Merbs, C.F.

(n.d.). Burial patterns in the Canadian Arctic. Paper delivered at 32nd Annual Meeting, Soc. Amer. Archaeol., Santa Fe.

Murdoch, J.

(1888). Dr. Rink's "Eskimo Tribes." *Amer. Anthrop.,* o.s. 1(2): 125-33.

(1892). Ethnological results of the Point Barrow expedition. *9th Ann. Rept., Bur. Amer. Ethnol. 1887-88.* Washington.

Nelson, E.W.

(1899). The Eskimo about Bering Strait. *18th Ann. Rept., Bur. Amer. Ethnol. 1896-97.* Washington.

Nichols, H.

(1967). Pollen diagrams from Sub-Arctic Central Canada. *Science* 155: 1665-68.

Noice, H.

(1922). The Copper Eskimos. *Science* 55: 611-12.

O'Bryan, D.

(1953). Excavation of a Cape Dorset site, Mill Island, West Hudson Strait. *Natl. Mus. Canada, Ann. Report 1951-52, Bull.* 128: 40-57. Ottawa.

Oschinsky, L.

(1964). *The most ancient Eskimos.* Ottawa, Canadian Res. Centre for Anthrop.

Penrose, L.S.

(1954). Distance, size and shape. *Ann. Eugenics* 18: 337-43. London.

Quimby, C.I.

(1962). The Old Copper Culture and the Copper Eskimo, an hypothesis. In Prehistoric cultural relations between the Arctic and temperate zones of North America, ed. J.M. Campbell, pp. 76-79. *Arctic Inst. North Amer., Tech. Pap.,* no. 11. Montreal.

Rae, John

(1850). *Narrative of an expedition to the shores of the Arctic Sea in 1846-47.* London, Boone.

Rasmussen, K.

(1932) Intellectual culture of the Copper Eskimos *Report of fifth Thule expedition 1921-24*, vol 9 Copenhagen

(1941) Alaskan Eskimo words ed H Ostermann *Ibid*, 3(4)

(1942) The Mackenzie Eskimos ed H Ostermann *Ibid*, 10(2)

Rink, H.

(1891) The Eskimo Tribes *Meddelelser om Grønland* 11, supplement Copenhagen

Rudenko, S.I.

(1961) The ancient culture of the Bering Sea and the Eskimo problem *Arctic Inst North Amer., Anthrop of the North*, trans from Russian sources no 1 Toronto

Seltzer, C.C.

(1933) The anthropometry of the Western and Copper Eskimos, based on data of Vilhjalmur Stefansson *Human Biol* 5(3) 313-70

Service, E.R.

(1962) *Primitive social organization* New York, Random House

Shapiro, H.L.

(1931) The Alaskan Eskimo a study of the relationship between the Eskimo and the Chipewyan Indians of Central Canada *Anthrop Pap., Amer Mus Nat Hist* 31 374-84

Simpson, T.

(1843) *Narrative of the discoveries on the North Coast of North America, effected by the officers of the Hudson's Bay Company during the years 1836-39* London, Richard Bentley

Sokal, R.R. and P.H.A. Sneath

(1963) *Principles of numerical taxonomy* San Francisco, Freeman

Spencer, R.F.

(1959) The North Alaskan Eskimo *Bur Amer Ethnol., Bull* 171 Washington

Stager, J.K.

(1967) Fort Anderson the first post for trade in the western Arctic *Geog Bull* 9(1) 45-46

Steensby, H.P.

(1917) An anthropogeographical study of the origin of the Eskimo culture *Meddelelser om Grønland* 53 Copenhagen

Stefansson, V.

(1913) *My life with the Eskimo* New York, MacMillan

(1919) The Stefansson-Anderson Arctic expedition preliminary ethnological report *Anthrop Pap., Amer Mus Nat Hist* 14

Taylor, W.E.

(1959) Review and assessment of the Dorset problem *Anthropologica*, n s 1 (1-2) 24-46 Ottawa

(1963) Hypotheses on the origin of Canadian Thule Culture *Amer Antiquity* 28(4) 456-64

(1964) Interim report of an archaeological survey in the central Arctic *Univ Alaska, Anthrop Pap* 12(1) 46-55

(1965) The fragments of Eskimo prehistory *The Beaver* 295 4-17

(1966) An archaeological perspective on Eskimo economy *Antiquity* 40(158) 114-20

(1967) Summary of archaeological fieldwork on Banks and Victoria Islands, Arctic Canada, 1965 *Arctic Anthrop* 4(1) 221-43

(1968) The Arnapik and Tyara Sites, an archaeological study of Dorset culture origins *Mem Soc Amer Archaeol* 33(4) pt 2

(n.d.) An archaeological survey between Cape Parry and Cambridge Bay, N.W.T., Canada, in 1963 Manuscript on file, Archaeol Div., Natl Mus Canada Ottawa

Usher, P.J.

(1965) Economic base and resource use of the Coppermine-Holman Region, N.W.T *Rept no 65-2* Northern Co-ordination and Research Centre, Dept Northern Affairs Natl Res Ottawa

VanStone, J.W.

(1962) An archaeological collection from Somerset Island and Boothia Peninsula N.W.T *Royal Ont Mus., Art and Archaeology Div., Occasional Pap* no 4 Toronto

Vibe, C.

(1967) Arctic animals in relation to climatic fluctuations *Meddelelser om Grønland* 170(5) Copenhagen

Walker, H.M. and J. Lev

(1953) *Statistical inference* New York, Holt, Rinehart and Winston

Wissler, C.

(1909) Notes concerning new collections *Anthrop Pap., Amer Mus Nat Hist* 2(pt 3)